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## NEWS IN BRIEF

### Underwriters switch

THE Institute of London Underwriters has rejected ICL's DME/System 4 on 2960 as a replacement for its seven-year-old ICL System 4/50, in favour of splitting its workload between a Univac 90/30 for batch processing and three Honeywell Level 6 minis for data entry.

### Going it alone

GLASGOW District Council has cut its data processing ties with the Strathclyde Regional Council, and is to establish its own computer services department by installing two Honeywell Level 6/6 systems. The machines, a Level 6/6-DPS-14 and Level 6/6-20, will be delivered next year.

### IDPM elections

NOMINATIONS and motions for the annual meeting of the Institute of Data Processing Management should be submitted to the Secretary-General at 12 Henrietta Street, London WC2E 8NU by 5.00 pm, Wednesday, July 18. The meeting is to be held at the Royal Horseguards Hotel, near Charing Cross Station, on Thursday, July 26 at 4.30 for 5.00 pm.

### Memorex link-up

XEROX Sigma 8 mainframes at the Comshare bureau in London are to be interfaced with £500,000 worth of 200 Megabyte Memorex 3675 disc drives using a special interface called the I-channel developed by Comshare itself.

## COMPUTER MARKETING HAVE IT...

	TERMINALS	RENTAL	PURCHASE
ICL	1000-line VLSI 52 Emulation	from £500pm	£840.
ICL	Facsimile range or Branch VLSI	from £100pm	£495.
MID	Multi-terminal interface	from £570pm	£975.
TALLY	16-24 terminal Centralised	from £1190pm	£1895.
TALLY	16-24 terminal distributed	from £1190pm	£1895.
SHARER	ATM 1600	from £500pm	£825.
SHARER	ATM 2000	from £190pm	£895.
SHARER	ATM 2000/2400	from £100pm	£1675.
SIGMA	ATM 1600/2400	from £200pm	£1095.
SIGMA	ATM 2000/2400	from £100pm	£195.
SIGMA	ATM 2000/2400	from £1110pm	£2168.

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## Products launched in time for WP Fair

COINCIDING with the Word Processing Exhibition at Wembley this week, a spate of new products have been announced by both hardware and software suppliers, including a small-scale shared logic system from AES Wordplex and WP software from Altergo for the IBM System/34.

be upgraded in the field for £2,202. The new Wordplex 4 can support up to six screen typing stations and four printers, and is intended to fit in between the Wordplex 7 shared-logic system and the 1.3 three-station cluster. At a price of £46,450 it is being launched by AES Wordplex under the slogan "simple shared logic". There are 32 Mbytes of document storage, half of it on a fixed disc and half on a removable cartridge. Altergo's WP software for the IBM System/34 small business system is called Wordpower and was developed by Professional Computer Resources of Illinois. It concentrates on facilities for assembling documents from standard paragraphs and producing mail shots by merging a letter with a list of names and addresses.

In an effort to increase the appeal of its ink-jet printer, IBM has introduced a new high-speed version that can print 180 characters a second, at double the normal speed, with reduced character quality. The usual 92 characters a second can also be selected. Seven different typestyles are available instead of the five hitherto.

The Dual Speed Document Printer, as it is called, costs £10,138, but existing units can

## Battle over cash cuts at Brunel

CUTBACKS in student numbers brought about by cash limits and new controls from the University Grants Committee have led to bitter battles over enrolment at Brunel University's Computer Science Department.

Rebellious teaching staff, instructed to cut their intake from 50 students to 40 for next year, resolved to press ahead with tenching unenrolled numbers, and have been threatened with yet further cuts in funds.

These difficulties, which are affecting universities across the country, are likely to be aggravated by economies still to be introduced following the new government's Budget, but the effects of these are as yet not determined.

UGC grants have not been keeping up with inflation, and to prevent universities "eating their own flesh" by stopping spending on capital and

## Ansi committee set up to develop graphics language

THE American National Standards Institution has approved the formation of a new committee to develop a standard computer graphics programming language (CGPL).

To be called X3H3, the committee is being convened by Dr Peter Boni and will hold its inaugural meeting from September 19-21 at the headquarters of CEA/MA, in Washington. Dr Boni, of the Naval Underwater Systems Centre, New London, has been extensively involved in US and international graphics activities since 1974.

Among the first objectives of the work will be the definition of two and three dimensional output primitives, viewing transformations, and interaction.

The CGPL effort brings to three the number of completely new standards being developed in the US.

Early last year, the Codasys committee dedicated to creating a Common Operating System Command Language (COSL) met for the first time (CW, March 23, 1978) while Ansi in the autumn launched a committee for the purpose of defining a standard text processing language (CW, August 24, 1978).

Under the proposals, the grade of Licentiate would be abolished and more people would be encouraged to take up membership through exemption from the Society's exams.

He said he was confident all existing and future UK would continue to receive Data Efficiency, the society they are entitled to expect.

According to Sousan, the gestation that Euapple I "dumped" existing disk Personal Computer was true, and that by implication reverse was the case.

"Euapple values Perso

Computers as a customer respects their business," Sousan said.

The decision whether

appoint Personal Computer

a sub-distributor in the set-

up was left by Sousan to

Brewer, managing director

Data Efficiency. Brewer &

against this route.

According to Sousan, a

change in UK marketing

prompted by a telex from

Computers managing direc-

tor, Mike Sterland dated May

have only 40 students.

It now appears that next term

the final number of students will be 62.

Bob Parslow, who is shortly to become head of the department, suggested that it was ridiculous in the current economic plight to cut training in areas vital to the economy.

He pointed out that UCCA applications for computer courses are up 55% this year, and said it was tempting to think that both governments were trying to kill the universities, but it was more likely they were simply trying to deal with short-term problems without considering the future.

"In two years' time," Parslow said, "everyone will be screaming 'where are our computer scientists coming from? The effect of these cuts won't be seen for three years."

He was also responsible for Ptar-

mington.

He was also responsible for Ptar-



# Downtime

*by Chas...*

## Having a lovely time, really...



TIME-SHARING, it seems, is no longer the prerogative of computer users; you can now "time-share" a building.

The scheme, floated by an Australian firm of property developers, allows you to buy a time-slice of a holiday home. The freehold of the property is yours, but only for a few weeks each year. The remaining time-slices are held by other users, who pay a proportionate fee. As in a computer system, you remain, with luck, unaware of their existence, and it's just like having the machine — sorry, the home — all to yourself.

We computer experts know, of course, that that's not real time-sharing. Real time-sharing, in a primitive way, is what hotels do. Everyone

books in at random, and the last man in hammers on the button trying to get into a full system.

Heaven help us if the holiday home men ever find out about modern time-sharing techniques. We'd keep getting relocated from room to room every time they wanted to slot a large party of Japanese tourists into a contiguous block of storage. To enable visitors in which the group held a minority share bought themselves out.

About a third of the bureau's business used to be work for Weetabix itself, but the cereal company now runs its own Unic 90/60 in-house.

The crowning touch would come when they discovered virtual storage. Decent accommodation would then be reserved for active guests. Every time you went to sleep, you'd get swapped out to a shed at the back.

## Honeywell accent on soccer

MY roving sports correspondent tells me that soccer fever, sweeping the US, has reached Phoenix, Arizona, where staff at Honeywell's Information Systems Division have started up a league with no fewer than six teams. The stars come from Honeywell's factory in Scotland, where they played semi-professional football with Scottish clubs before they were transferred to Phoenix.

To give identity to the teams, the Honeywell people have made a rule that each side

must feature no more than two accents. They have a choice of English, Scottish, Spanish-American, Swedish, and US players, so there is plenty of choice there. (I presume they do not distinguish between Geordie, Scouse, Cockney, etc.)

This autumn Honeywell is hoping to interest other computer and electronics firms in setting up an inter-company league. They have already played GTE and are wooing Digital, Motorola and others to put up teams.

## Weetabix seeks buyer for bureau

WEETABIX, the breakfast cereal manufacturer, is seeking a buyer for its computer services subsidiary, Northamptonshire Computer Bureau, which is located at Burton Latimer near Kettering and operates a Univac 90/60.

Weetabix said that it would prefer a buyer already in the bureau business, and the company has prepared a prospectus detailing what its bureau has to offer. As well as the 90/60, the subsidiary will come with 35 staff and a large number of relatively small batch and remote batch clients. The bureau chalked up a turnover of £250,000 last year, but Weetabix would not discuss profitability.

The establishment of the new Manchester venture will follow closely on the shake-up within the Gamma Group in which three of the associate companies in which the group held a minority share bought themselves out.

The Gamma Group said that it was definitely not selling Gamma Business Machines, its subsidiary that it set up last year to exploit the market for IBM Series I based systems (CW, June 1, 1978).

The three associates were Gamma Computer Products, the retained maintenance company,

TERMINAL distributor Computer Marketing has moved further towards the systems market by buying Micro Software Systems, a 12-month software house started less than two years ago by four ex-Tops programmers, and by negotiating marketing rights to word processing software from a UK university.

Having started by writing applications software to order, MSS now has several standard packages including payroll, sales, and stock control in Basic for various micros, particularly the North Star Horizon and Alpha Micro systems. The Comma VCO, which has won £500,000 worth of orders since its

development on North Star Horizon, the word processing package will be sold as an add-on to it. It will add about £2,000 to a £6,000 system.

They will join the range marketed as Comma Systems, and are now moving into offices in West Horndon Industrial Park. Trading under both names for the time being, the combined organisation plans to drop both eventually in favour of its brand name Comma Systems.

The first order for the Alpha Micro based Comma II system is worth nearly £200,000 and comes from a nearby firm New World Kitchens. It is due to be delivered in October and includes 128K of RAM, and megabytes of disc capacity.

launched last November — 15 of the systems destined for use as word processing terminals and in-house video display services.

Both firms are based in Essex and are now moving into offices in West Horndon Industrial Park. Trading under both names for the time being, the combined organisation plans to drop both eventually in favour of its brand name Comma Systems.

The reason that at least until 1981, the system capacity will be limited to 200,000 frames — but demand from existing and potential information providers would warrant doubling the capacity.

Contracts with information providers come up for renewal in September, and in practice, the Post Office's warning is likely to mean that the handful of the 164 ISPs who have booked the minimum 100 pages but are only using one or two will be asked to make way for others desperate for additional space.

The reason that some organisations booked space and have not used it is that their main interest is in market trial results which come automatically to information providers.

✓

## PO's role changes

WITH a faint air of embarrassment, the Post Office has notified Prestel Information providers that it will have to suspend its traditional role of common carrier, under which it allocates space on the service on a first-come first-served basis.

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A DRAMATIC expansion of the capacity and the geographic coverage of the Post Office's Prestel viewdata service planned over the next 12 months, at the end of which the service should be in local call reach of 60% of UK telephone subscribers.

In December additional London centres will be opened in Wood Green, Eltham and Ealing, and Prestel will move out of the capital with a centre in Birmingham.

At the end of this month, the Post Office will change the system of charging for Prestel access. Hitherto, the Corporation has levied a halfpenny charge for each page a user calls up, in addition to the standard charge for the phone call. Thus the minimum price for any page was 1/2p. (Most pages additionally carry a charge imposed by the information provider.)

In future the Post Office will charge simply for connect time to the Prestel computer — plus the phone call charges — so that the price on each page will go in full to the information provider.

The new Post Office levy will be 3p per minute during business hours and a penny a minute for evenings and weekends.

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distances in local and junction exchange circuits which Plessey believes will be the first big international market.

The company is developing systems for 34M bps and 140M bps transmission, which it says it can have ready when the need arises. They carry 480 and 1,920 channels respectively.

Although optical fibre transmission is still more expensive than copper, costs are falling fast and Plessey believes that within five years it will be taking between £7.5 and £10 million of a £40 to £50 million market.

## Overseas holiday booking system

BOC Datasolve is developing a computerised booking administration system for continental, the overseas holiday club company. The system will in the first instance provide confirmation of bookings and produce invoices for the 70,000 tourists using continental each year.

## Plessey plans autumn launch for 10 kilometre fibre optic system

PLESSEY, in partnership with cable maker BICC, now has a fully developed optical fibre transmission system for public telecommunications use. It is capable of carrying 120 multiplexed, pulse code modulated voice or data channels, with distances of around 10 kilometres between signal regenerators.

The main commercial launch is planned for Telecom 79 in Geneva in September, but a demonstration system is installed and working over a 14 kilometre route between Slough and Maidenhead, with one repeater 4½ kilometres from Slough.

The Post Office is also about to place orders worth £1.5 million for 14 systems to be installed in five routes between next year and 1982. They are part of £5m worth of orders to be shared out between the three main UK telecommunications suppliers, GEC, STC and Plessey.

The demonstration system and the first four Post Office routes use 8M bps transmission, suitable for 1 to 50 kilometre distances. The Post Office is also about to place orders worth £1.5 million for 14 systems to be installed in five routes between next year and 1982. They are part of £5m worth of orders to be shared out between the three main UK telecommunications suppliers, GEC, STC and Plessey.

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TIM PALMER REPORTS ON DEVELOPMENTS IN PRETEL

## Local access for most by 1980

### Problem of VAT on pages

A THORNY little problem over VAT and Prestel has arisen, and information providers and the Post Office are anxious for a speedy solution.

There is no argument that VAT is chargeable on accesses to Prestel, since it is a service. However, it seems equally clear that page charges, which are specifically for information, should be zero rated for VAT, since they are of a kind with newspapers and books, which are zero rated.

The Post Office plans, just published, also involve the launch of a full public service in London on September 11, and a change in the charging procedure, to take effect from the end of the month.

But the Department of Customs and Excise goes strictly by the book, applying the rule that VAT is chargeable on anything which has not specifically been assigned a zero-rating — and of course the "book" was drawn up long before Prestel was more than a gleam in the eye of a few imaginative Post Office people.

Some assiduous lobbying of MPs is therefore needed to get what is clearly an anomaly resolved in favour of the information providers. The issue goes beyond Prestel, because electronic information services of all kinds are likely to appear over the next five years.

After the switchover, information providers will update computers at a centre in Clerkenwell, and their updates will

## Auditor hits out at low control levels

A REMARKABLE attack on the "alarmingly low standard of inherent control" in many computer systems was made in London last week by Graeme Ward, president of the Institute of Internal Auditors.

The institute was concerned, he said, about the low standard of computer auditing, both in the public and private sector. However, unlike many observers, it did not see computer fraud as the major problem.

"Minuscule" research had been devoted to researching the needs of computer auditors and providing tools for them to work with. The institute was convinced that the answer lay in the availability of flexible and powerful software, provided in the main by the hardware manufacturer.

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# GILB'S MYTHODOLOGY

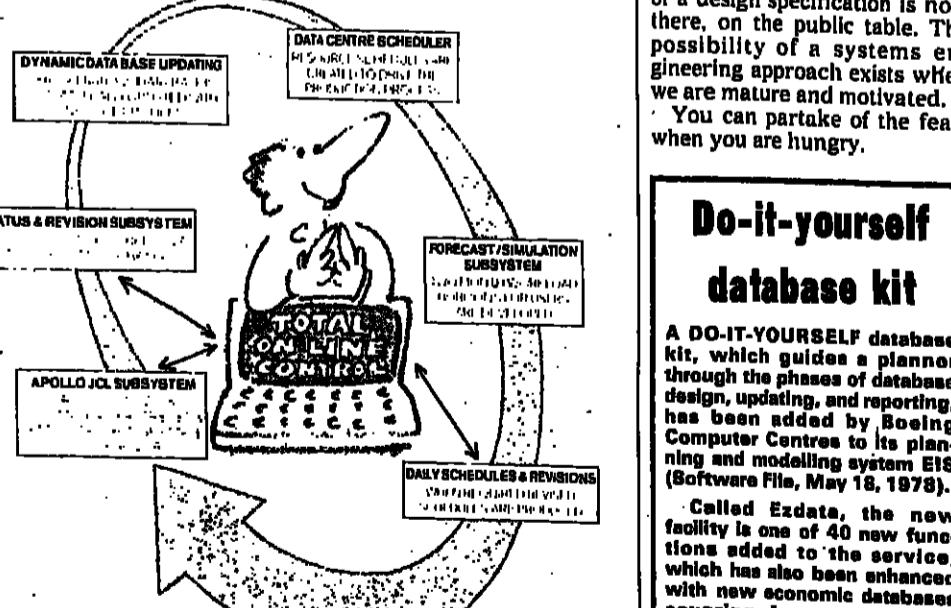
## Towards clearer analysis of a design specification

THE tool discussed in this column, the Quota/Control Table (Q/C), is a quantified extension of the Function/Attribute Table which we showed in our last column (CW, July 5). I shall illustrate it by continuing to use the example of a 'specialised maintainability' design which was used in the two previous columns. If you don't have these two columns handy, I hope the example will speak for itself.

In any system design process, even a fairly small-scale one, a large number of decisions must be made to give us the system attributes we want. In many design situations we can afford to use an 'overkill' method. We simply overdo the qualities, and can afford the cost and the time to do so. In other situations we try to make a reasonable job of it, based on previous experience. If the initial system does not perform the way we want it to, we patch the design by adding or altering features until we are satisfied.

In some systems neither of these simple approaches is satisfactory. We must try to get it right the first time, and we cannot afford any more time or money than necessary to do so. In these cases a higher degree of planning effort is the cheapest alternative and the one that takes the least project time.

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The Quota/Control Table is simply a format for stating in writing the opinion of the designer on the approximate effect which his/her design decisions are expected to have. If they have no effect, there is no reason to make them at all. So presumably the designer has some knowledge of the effect of a design decision, and should be required to state an opinion — including the degree of uncertainty of the decision.

The Q/C table does not only capture the immediate opinion of the designer. It also allows a cumulative picture to emerge of the progress towards the design goals. It allows an estimate of the certainty, and thus uncertainty, of the achievement of these goals: the risk of success is estimable. And finally, it eases the communication of the designer's opinions to design review committees, which are gaining tremendously in importance as the lessons of IBM's inspection method become more well-known (this will be the subject of a forthcoming column).

The illustration accompanying this column describes the Q/C table in a nutshell. I have used the system attribute specifications (left-hand vertical column of the table) from my recent column (CW, June 21)

and used the suggested design decisions proposed in the column which followed.

Next, here in the Q/C table, I have made a designer's personal estimate of the degree to which the planned level (restated in parentheses beside each objective, at the left) will be fulfilled.

Whenever I have been in doubt as to the degree of effect which a design suggestion will have, then I have indicated this approximately with a plus/minus deviation. These deviations are expressed in the same "currency" as the percentages and can be cumulated. Estimates of  $20\pm 5$ ,  $10\pm 15$  add up to  $30\pm 20$  and  $-5$ , or in other numbers indicates that the designer estimates that the planned level of that attribute is about 30% fulfilled. But, in the worst case maybe only 25% ( $30\pm 5$ ), and in the best case maybe as much as 50% ( $30\pm 20$ ) is fulfilled.

The numbers are only as good as the person stating them but the alternative is unpleasant to contemplate: vague meaningless words and assertions which cannot be communicated to others and are not subject to any kind of quality control.

Even when the numbers estimated are unreasonably incorrect by any standards, they can be subjected to independent inspection by professional colleagues. And even when these colleagues accept meaningless numbers, as they will on occasion, they will have to accept responsibility for their inadequate audit of the design decision. They will have to admit that the assertions of design effectiveness were communicated clearly to them.

I do not expect the majority of readers to rush out and make extensive use of this technique. Their environment will not permit or encourage it even if they are able and willing. But the possibility of such clear analysis of a design specification is now there, on the public table. The possibility of a systems engineering approach exists when we are mature and motivated.

You can partake of the feast when you are hungry.

### Do-it-yourself database kit

A DO-IT-YOURSELF database kit, which guides a planner through the phases of database design, updating, and reporting, has been added by Boeing Computer Centers to its planning and modelling system EIS (Software File, May 18, 1978).

Called *Exdata*, the new facility is one of 40 new functions added to the service, which has also been enhanced with new economic databases covering, for example, consumer price indices and gross national product figures.

### Puzzler

TONY CIMA, of the Mercantile and General data processing department in Cheltenham, contributes the following darts problem for readers' mystification:

A top-class player gets 30 with only six darts, starting and finishing on a double, and scoring in a different area of the board with each throw. Where did the six darts land exactly? See page 63 for solution.

Design specification code	Objective area (planned level)						
	Full database audit program in DBA	Distinct software logic module M 2TG	Inspection criteria C 157	Fortran 77	ALGOL 68	All other codes RC, PL/1, TEL/LIB	MINS
Problem recognition (60 mins)	80%	10%	5%	0%	?	0%	
Administrative delay (60 mins)	0	95% (bugs) if online replacement	0	0	0	50% (full)	0
Tool and document collection (10 mins)					90% (M LIB)		
Problem analysis (5 to 10 mins)	30%	30%	20%	15%	5%	5%	
Change specification (5 mins ?)	0	0	0	50%	10%	20%	
Active correction (15 to 30 mins)	0	95% if online bug correction	-10%	80%	10-30%	-20%	
Local correctness test (5 mins)	10%	30%	30%	20%	5%	30%	
Global side-effect test (100x act. corr)	80%	5%	15%	5%	0%	15-25%	
Independent change audit (some day)	50%	4%	5%	0%	1%	40%	
Recovery from effect of problem (2 hours)	0	0	0	0	0	0	

Quota/Control Table: An example from a maintainability design.

### PROGRAMMER NOTES

## Value of an 'editor' in development process

MANY who speak and write on software practice acknowledge that reading other people's programs is one of the best ways of furthering one's understanding of programming and its problems.

And in recent years, there has been increasing emphasis on the use of inspection to improve software quality, both at the design and at the coding stage.

Structured walk-throughs and code reviews have many advocates and are practised in many different ways in different places, with varying regularity and thoroughness. However, when properly conducted, they impose an overhead in time and effort which is not incon siderable.

The completion of the editing step would be a prerequisite for acceptance of the program into

checked for intelligibility, continuity, and style by a "program editor".

Its responsibilities could extend to the incorporation of revisions, and would certainly include verifying that documentation was adequate.

Programmer Note

for the discussion of basic and non-technical matter to programming. If you applications or systems and have viewpoints any other aspect of please write to: Program Notes, Computer World House, Stamford Road, SE1 8LU.

the live inventory and hopefully, ease the post-maintenance, by making unintelligible programs not accepted for open.

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Programmer Note

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A strong theme of the conference this year will be the application of automated tools to software engineering, including, for example, the use of computer aided development environments.

Such tools, along with aids to managing large software systems throughout their life cycle, attracted a high proportion of submissions following the call for papers and form the subject of several major sessions.

Among other topics to be covered, both by practitioners and researchers, are the role of software engineering in microprocessor work; the impact of language on software engineering and the role of constructive techniques.

The conference will open with implementations of two supporting packages, the Data Dictionary and Utilities. The latter provides high-speed database load/unload facilities as well as statistical information to control the database.

The DBMS software is backed up with implementations of two

audio-visual or computer-assisted media.

This seminar will put them in perspective.

For further Seminar details contact NCC

Tel: 051-228 6333 (Val Cording) or 051-551 0700 (Tricia Warren).

For bookings please telephone 051-228 6333 (Val Cording) or 051-551 0700 (Tricia Warren).

Joan Seth (SI 3) The National Computing Centre, Oxford Road, Manchester M1 7DP.

Offered on bureau

PREVIEW, the package developed by Langton Information Systems to convert conventional

structured files into Prestel

format (Software File, March 9,

1978) is being offered for use on a bureau basis by Unilever Computer Services Ltd (UCS).

### SOFTWARE FILE

## CA links up with HPAC compilers

SOLVING at a stroke the need for specifically European languages on its systems, Computer Automation has entered into an unusual marketing agreement with HPAC, of Oxford, giving it rights to sell the entire range of HPAC compilers on the Naked Mini LSI-2 and LS1-4.

Likely to be of most relevance in the immediate future are HPAC's implementation of Coral and RTL/2. CA has also noted a remarkably high level of interest in BCPL which HPAC uses to implement all its compilers and fully supports as a product in its own right.

Both the Coral and BCPL compilers are already available as in HPAC's Fortran 77 compiler, first announced last year (Software File, November 30, 1978). The RTL/2 compiler is due to be released shortly.

HPAC is also working on implementations of Algol 68 and Basic.

In the longer term it plans to produce Pascal and Cobol compilers as well as a Mascot system to support Coral applications.

CA's agreement with HPAC is worldwide. It is likely though to be applied first in the UK and

elsewhere as soon as the compiler is ready.

According to a spokesman, this is partly because the SPL version is less efficient, being targeted at a register-based architecture like that of the PDP-11.

HPAC RTL/2 has also been implemented on the Data General Micronova, Nova and Eclipse (Software File, January 4).

Outside Europe the HPAC compiler likely to be of most interest is Fortran 77. Fortran 77 has not yet been implemented by CA, though it does have an

implementation of Fortran IV.

A feature of the HPAC compiler is that it can process either Ansi 1968 standard Fortran or Fortran 77 according to the setting of a compile-time switch. It also includes switchable options for processing Hollerith data types and real time extensions.

All the compilers will be available to CA users at £750 each, marking a significant reduction in prices previously quoted by HPAC.

According to a spokesman, the chance to make the software available to users at lower cost was an important consideration in CA entering the marketing agreement.

CA, he said, saw itself primarily in the business of selling hardware and wanted to keep software costs low.

Europe,

where the demand for

RTL/2 and Coral is high.

Interestingly, one of the first customers for HPAC RTL/2 will be ICI. The ICI front end has, up till now, been common to all RTL/2 compilers, contributing greatly to the enforcement of a rigid standard for the language.

Despite this, the company is reported to have given wholehearted approval to the HPAC product, which it is likely to use initially on the NM4.

There is already an SPL implementation of RTL/2 for the NM4's predecessor, the NM2, but CA says that it will be recommending HPAC RTL/2 on both machines.

According to a spokesman, this is partly because the SPL version is less efficient, being targeted at a register-based architecture like that of the PDP-11.

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### UK Professor for top Ada job

A UK expert is to head the Pentagon team

working on the programming support environment for Ada, currently defined by the

Pentagon specification.

He is Professor John Sutton, Dean of the College of Advanced Sciences at Warwick University, who will spend a year in the US co-ordinating the Pentagon's effort for the high order language working group of Darpa.

The news follows York University's

proposal that it should set up a centre to co-ordinate work on Ada in the UK. This would also concern itself primarily with the support environment (CW, July 5, 1978).

• The Ada test and evaluation newsletter

reported that an update to Pebbleman should

be ready by mid-September.

### Pascal for Honeywell

**OP SPOT**

By Bernard Allen

**Getting it right from scratch**

THE beauty of building a new installation from scratch is that you have the chance to get the computer room just right — and as the picture on the left shows, Volvo's new High Wycombe centre was certainly started from scratch.

The dirty old workshop was turned into a sparkling new computer site (right) at a cost of £100,000 by Wright Air Conditioning (Birmingham), which also designed and installed the air conditioning system.

The computer room accommodates two ICL 2950s, which are handling work previously run at Volvo's site at Crick, Northamptonshire.

**Phone loudspeakers for noisy rooms**

IN last week's Op Spot we had a hint relating to the use of telephones with a volume adjustment facility as a means of helping the operator deal with calls in a noisy computer room.

And, taking such aids a step further, the Post Office has introduced a small loudspeaker system to be coupled with the telephone. It would, for example, allow the operator to tend a printer and talk to job control at the same time.

Called Dori, it has a volume adjustment

facility, eliminates low-level background noise and has a cut-out button so that the telephone can be used in the conventional manner if desired.

According to the Post Office, Dori is intended primarily for domestic use, but is also suitable for the computer room environment. It would, for example, allow the operator to tend a printer and talk to job control at the same time.

The rental charge for Dori is £14 a quarter.

**Altering unit status with Vary**

THE Vary command is used by the IBM OS operator to alter the status of units on the system configuration.

By means of this command tape and disc units, for example, are placed in an online or offline state. In the former, they may be allocated to jobs, while in the latter they may not.

A tape unit will, typically, be placed in an offline state so that it can be serviced by an engineer

or cleaned by one of the operators. The command to place tape unit 280 offline is:

V 380, Console, Rout = All,Auth = All

In relation to systems consoles, the operator uses Vary to assign authority and specify which of the various system message streams are to be routed to each device. For example, to give console 380 full authority with messages relating to the entire system

**Narrow-minded?—no, just standing up for themselves**

THE action taken by the operators at the West Midland Health Authority (CW, July 1979) may seem a mere gesture when compared to the operations involvement in the current Post Office dispute.

In terms of persons taking part and the extent of their action, it is small — just 13 operators are involved and they are refusing to run some 16 special back-pay jobs for WMHA employees who have already had pay rises.

But, as pointed out in a recent Computerview, the effects of such actions are disproportionate to the number of operators involved.

At the time of writing, those affected already include the likes of West Midland ambulances, hospital maintenance staff and blood transfusion operators. All await considerable sums of back pay.

In addition to this, the operators will refuse to run all new pay awards work if their pay rise has not come through by July 31. Non-operators, non-union persons may well agree with a report in a certain Midlands paper which described it all as a "You don't get your money until we get ours" dispute, implying that the operators are being narrow-minded and selfish.

As one with an operations background, I view the matter from a different angle, although I do sympathise with the unfortunate WMHA staff hit by the action.

As we all know, operators in general are very much the poor relations of the computer industry, in terms of recognition, pay and career prospects. That being so, they often have to stand up for themselves.

It is unfair to label the WMHA operators as "buddies." They are acting on behalf of and with the full backing of the local branch managers. The operators have done with all systems in the data processing industry what is to be expected from the ABP/SAC for most of the past five years.

It is time for the computer industry to take note of the ABP/SAC's actions.

**What is Double Domino?**

It is Borer's latest technique that makes the connection between the computer and the telephone system.

**borer** 48LSI

**DOUBLE DOMINO****High Speed Data Modems with Borer's unique performance advantage**

The 48LSI is a 1536 baud, error-free data rate, multiport Borer Clustering® Reliable economical alternative to concentrators.

48LSI is a single board, multiport system.

Borer's unique performance advantage is the ability to connect up to 16 telephone lines to a single computer system.

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## MICRO NEWS

## Broadway opening

THIS is Mike Dauncey, one of the two founders of a new computer store set up to serve the West London area.

The company is Adda Computers and, based in the Broadway in Ealing, it will be dealing in Pet, Apple and Nascom hardware.

With his partner David Whitehead, Dauncey intends to provide a wide range of customer support services, including systems design, programming and hardware engineering services.



## Two-way second sourcing

MOTOROLA and Rockwell International are currently negotiating a two-way second sourcing deal which will give each a domestic US alternative supplier.

Rockwell's Microelectronic

Devices division is expected to build Motorola's 68000, 16-bit processor, thus joining Hitachi as an alternative supplier, while Motorola will probably become the second source for Rockwell's 256K-bit bubble memory.

## Rival to minis will follow AMD-Zilog collaboration

THE first fruits of the second source agreement between Advanced Micro Devices and Zilog for the Z8000, 16-bit microprocessor, should soon be seeing the light of day from AMD's Sunnyvale, California, factory.

AMD has made public the details of three peripheral control devices which, when connected in systems configurations with the Zilog processor, should give a processing capability that genuinely starts to rival that of minicomputer systems.

To allow full advantage to be taken of the processing power of the 16-bit device, the new peripheral circuits will employ a combination of complexity and performance never needed for 8-bit processors.

An indication of this can be seen in one of the peripheral chips, a device called a burst error processor. This is more than capable of dealing with data transfer at the rates used by hard disc storage systems.

The other two devices, a video display controller and a direct memory access controller, will have the ability to fetch their own commands from memory in the same way as the CPU.

The burst error processor, like the other two devices, satisfies the main criterion for peripheral chips, that of unloading the CPU overheads wherever possible, so that it is free for other work.

When a data block moves from buffer store to disc memory, the burst error processor adds bits to the end, in accordance with a polynomial calculation designed to detect and correct errors. The 24-pin device, which need not even be connected directly to the CPU, is designed to be part of a micro-programmed disc controller.

As well as monitoring the data blocks between the buffer and disc, it also monitors the data going into the buffer, and compares the two. If differences are found, the disc controller then inverts the incorrect bits, in memory.

With this device, block lengths of up to 1,000 bits are possible, and data rates can be as high as 20 Megabits per second.

Both the DMA and display controllers connect directly to the Z8000 bus. The DMA will be able to load its own control parameters, and will also give the option to chain DMA operations together automatically.

The display controller is still in design, and AMD is hoping to include several advanced features such as multiple screen windows with any number of cursors per window, and variable spacing with justified margins.

According to AMD, the burst

by Martin Banks

## AI on a chip 'in two years time'

THE techniques of artificial intelligence will emerge from the laboratory and be sold commercially on a chip within two or three years, claims Edward Feigenbaum, of Stanford University, California. He thinks that a medical diagnostic program he has developed could and will be sold as an integral part of the spirogram equipment it works with, thus providing a practical application for a subject that has hitherto been regarded as theoreticians' dreams.

Taking all the different measurements, together with information from the patient's record such as age, sex, and rate of smoking, the program goes through the rules acting as an "inference engine" to work out the logic, and comes up with a diagnosis, such as emphysema or bronchitis.

Feigenbaum's program, named Puff, is an example of what is called an "expert system", containing in codified

form a set of about 100 rules supplied by a human expert, in this case a doctor. The computer is linked to a spirogram, which measures the strength and rate of a patient's breathing in order to detect pulmonary disorders.

Puff is in regular use at the Pacific Medical Centre in San Francisco, where a doctor checks the machine's diagnosis each time, and he agrees with it between 90 and 100 per cent of the time. Feigenbaum thinks that the software could soon be incorporated in every spirogram sold, so that instead of getting data out the doctor gets a diagnosis. A complete system could sell for less than \$10,000.

Feigenbaum was speaking at the artificial intelligence summer school at Edinburgh last week, where he described the latest developments in expert systems in the US, mainly in the medical field.

The company, which has appointed European agent the Lifespan Association, software products there, available in a wide variety of formats, and has nearly 80 programs in the pipeline covering most business applications from word processing to complete accountants.

Meanwhile, in the US, CDC has revealed that over the last six years it has made a cumulative loss on Plato of \$38 million but that it will "break even" in the next three or four years.

This collage representing IBM computer and office equipment was presented to the company's Basinghall Street office in London last week by pupils of Woodberry Down Comprehensive School, Hackney.

**IDPM aims for 10,000 members by 1981**

A TARGET of 10,000 members by 1981 has been set by IDPM chairman Neville Taylor in his annual report to the members, to be presented at the Institute's annual meeting on July 26.

1976.

IBM commissioned the collage and paid £500 for it. The money will go into Woodberry Down's twinning fund for special projects.

The annual meeting is to be held in London on Thursday, July 26 at the Royal Horseguards Hotel, behind Charing Cross Station at 4.30 for 5.00 pm.

The Institute of Data Processing Management has signed a five-year contract with Stirling Professional Publications of Edgware Road, NW2 for a year book. The first edition, due in January, 1980, is limited to full members. Members who wish to be excluded or want listed under another address should write to the IDPM.

## INDUSTRIAL NEWS ROUND-UP

## PO workers likely to accept pay offer

A POST OFFICE pay offer put to members of the Civil and Public Servants Association last week

will almost certainly be accepted and so end the strike action by operators and clerical staff that has been a major factor in causing the telephone billing backlog of about £700 million.

With the strike now into its third month (CW, July 12), it looked as if a major revision in management thinking would be required, but this latest offer is the same as that accepted by the Post Office Engineering Union, and rejected by the Society of Civil and Public Servants.

It gives a straight pay increase of 9% with 7% for productivity, plus a further 2.25% in allowance for shifting the pay review date from April 1 to July 1.

The SCPS claims that it has created a considerable strike fund and so can continue its action until its claim of over 20% is met.

"I think the Post Office will have to write off at least £40 million by the end of this strike," said an SCPS spokesman, "and it will probably be at least July 1980, before the phone bill backlog can be cleared up."

## Ban continues

THE

overtime and weekend working ban by members of the Society of Civil and Public Servants, which is affecting, among others, the Customs and Excise

computer centre in Southend, continues.

A quick solution is prevented by the government's clampdown on the public sector, which includes a freeze on promotion and recruitment plus cuts in department budgets (CW, July 12). A revision of these measures could be made next month, when the government's three-month moratorium is lifted.

## Bank offer

AN abrupt end to all strike action by Midland Bank computer staff (CW, July 5) came about this week following an improved pay offer by the bank.

The offer, which will give an across-the-board rise of 15% plus 2.5% for productivity, and a lump sum of 2.5% at Christmas, was worked out through the mediation of the independent arbitration body ACAS.

"I think the Post Office will have to write off at least £40 million by the end of this strike," said an SCPS spokesman, "and it will probably be at least July 1980, before the phone bill backlog can be cleared up."

## Ban continues

THE

overtime and weekend working ban by members of the Society of Civil and Public Servants, which is affecting, among others, the Customs and Excise

computer centre in Southend,

Special to August 31st  
TEXAS INST. 745  
12 months rental £60 p.m.  
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## 2960 for Computer

CORPORATE of Bracknell, Berkshire, is to take delivery of its third ICL 2960 this week. Added to its 2978 this is expected to enable it to provide soon over £5 million worth of services a year. The new machine will operate under DME to cater for growth in demand from 1900 users, who are either considering conversion to 2960, or just coping with overload.

## Boundary House Cricketfield Road Uxbridge, Middx.

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REDUCES Response Times, Processing Volumes, Overtime and therefore COSTS

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COMPEC'79 is sponsored by Computer Weekly, Data Processing and Systems International, the leading UK computer publications with the support of other IPC Business Press specialist publications.

### Surgery on Apple II first of a series

THE idea of surgeries for micro-computer hardware has proved popular enough for Micus, the specialist microcomputer group of the Institute of Data Processing Managers, to start planning for systems other than the Commodore PET.

The first addition to the types of hardware to be "doctored" at the surgeries will be the Apple II, and the first session is scheduled for August 23 at the offices of Digitsus, 68 Oxford Street, London, W1. The group is also plun-

ning later surgeries for the Tandy TRS80, the PET and the North/South

among others.

In addition to a user equipment and software show, the Apple surgery feature six users. They are available for question and advice on application methods.

Two of the main topics covered will be communication with bigger computers, and using Pascal on the Apple system.

**Forth for Tandy TRS**  
FORTH, the dictionary-organised language that has already been optimised to run on the RCA 1802 microprocessor, has now been adapted to run on the Tandy TRS 80 personal computer system.

This latest version of the language is called MMSForth, and comes on single diskette. Among the facilities it offers are enhanced keyboard command interpretation, and more sophisticated string sorts.

It comes with a basic operating system, and with arrays and double arithmetic. There is also the possibility of a built-in graphics facility.

On similar applications,

the Tandy version of MMSForth is said to times faster than the original.

(2A2)

Examination (if any)

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JOHN KAVANAGH AND RORY JOHNSTON AT THE WORD PROCESSING EXHIBITION

# Over 10,000 turn out to see the latest in WP

A CHANCE to see the big word processing systems announced over the last year by several big computer manufacturers was the main significance of the *Annual International Word Processing Exhibition*, held last week at Wembley. Otherwise the range of products on show from the specialist WP makers was not substantially different from last year, and the reaction of many visitors was "more of the same".

There was no shortage of visitors, however; attendance at 10,001 was up 61% on last year, showing that interest among the general public is growing at a healthy rate.

In the absence of any revolutionary mainstream products there were plenty of gadgets on offer from the manufacturers for attachment to their machines, ranging from improved stackers that at least output pages in the right order; to sensors that find the edge of the paper on the platen; to mechanisms for adding to golf-ball typewriters to provide electrical signals for input to a WP system. The Wang stenographic printer which was to have been the main attraction of the firm's stand was not in the event shown, although it was at the Hanover Fair in April.

The offerings of the computer giants included the IBM 3730



The Jacquard J800 dual-purpose word processing and data processing system, launched at the Wembley exhibition.

from Data Processing Division, Big Blue's first attempt at producing a true shared-logic word processor; ICL's 7700 Information Processing System, a two-station unit; and the OIS 140 from Wang, a firm which is no newcomer to this side of WP. Digital Equipment was at the Fair for the first time under its own name, showing the WS 200 shared-logic system and the WS 78 stand-alone.

The 7700 from ICL can only have one or two screens, with the ubiquitous floppy discs and daisy-wheel printer, and with the two screens costs £17,500. Its intended goal is the tantalising one of being able to do both WP and DP, and as might be expected it consequently leaves much to be desired on the ergonomic side, which is of course of critical importance in WP. For instance, there are dozens of functions operated by pressing a control key followed by a letter, and even with the menus that can be called up to remind one of the codes this involves a formidable amount of learning. Manipulation of columns of figures can be done, but the operation is complicated.

Dataword's Swedish associate, Wordex, is developing such a device which senses the movement of the typewriter's cams optically, and which should cost around £1,000 for each machine modified. This provides an input station much

cheaper than a WP screen and keyboard.

BDP Word Processing has a similar device already available, which it calls Intype. In both cases, the modified typewriter can be used only for input, not output, as the printing mechanism is unchanged, unlike with the Dataword. Transwriter which acts as a word processor on its own. Roll on the day when all typewriters are electronic and such mechanical modifications are unnecessary.

Transmission of documents from a word processor to a facsimile machine was demonstrated on the Logica stand using a fax receiver from Muirhead. Logica's newly-acquired blood brother under the Nexas banner, Nexas itself had no stand at the Fair, but was in evidence in the form of glossy brochures displayed on Logica's tables, already carrying the Muirhead and Nexas names together.

Also on the Logica stand was

Microwriter Ltd, demonstrating Cy Endfield's hand-held word processor with its chord keyboard (CW, May 11, 1978). Additional facilities have been added to the Microwriter including a TV interface to provide a full-screen display to supplement the hand-held unit's single line, and a cassette recorder to give unlimited offline storage.

Industry estimates of the size of the word processing market put it at between \$400 million and \$1,500 million.

The word processing market is not without its problems, however. "Support is becoming a very difficult area," said Fred Wang. "You're not just installing hardware — it's a complete systems approach. You have to re-think the way offices are run in some cases."

"We give a very high level of support compared with the computing side of our business: our people are only one step short of being management consultants. Support costs are

valued at £500,000.

At the same time Logica VTS has added another building society to its customer list. Following the Leeds Permanent (CW, July 12) is the Huddersfield and Bradford which is buying a single seven-station Unicom system.

ICL took its first order for a 7700 from Ipswich Borough Council.

Ipswich is installing a 2903 together with the 7700 to take over the work currently done remotely on the County Council's 19048. The 7700 will work independently to start with, doing both WP and DP, but an integrated system will be developed with the 2903 over the next two years.

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## Logica attracts Newman from Palo Alto

DEVELOPMENT staff have been on the move around the WP companies. Logica VTS, contrary to reports that have appeared elsewhere, has made quite a coup in attracting William Newman, an Englishman who for some years has

been working at Xerox's prestigious research centre at Palo Alto, California. At PARC Newman was involved with the Alto office computer and the system based on it called Official.

At the same time Logica has lost Marco Cappi, who is going to Los Angeles.

## Wang well placed to take share of a growing market

DEMAND for word processing systems has given Wang Laboratories a 63% increase in turnover to \$322 million in its financial year which ended in June 30. And net profits rose over 80% to about \$28 million.

Orders for all its products stand at \$180 million, more than twice the figure of a year ago, and that figure is all the more impressive because Wang says it normally ships products within 10 weeks of receiving an order. At this rate it will easily reach its target of a \$1,000 million turnover by the early 1980s.

"Our very high growth is due to our word processing business in the US," Fred Wang, vice-president of market planning and development and eldest son of the company's founder and president, told Computer Weekly at the Word Processing Exhibition. "But word processing is now growing fast in Europe and the Far East. And next year Wang will get going in South America."

Wang is well placed to take advantage of most of these markets. It has subsidiaries in Belgium, where it has its European headquarters, the UK, France, West Germany, Denmark, Switzerland and Australia. It also has representatives in Africa and Eastern Europe.

About 48% of its business came from outside the US last year, with Europe accounting for about 25% of total business.

The Datapro research organisation named Wang as the No 1 word processing system supplier in the US in 1978. Fred Wang claims that worldwide the company is top in screen-based systems, with companies like Vydec, AES, Wordplex, IBM and Xerox among the other leaders.

Industry estimates of the size of the word processing market put it at between \$400 million and \$1,500 million.

The word processing market is not without its problems, however. "Support is becoming a very difficult area," said Fred Wang. "You're not just installing hardware — it's a complete systems approach. You have to re-think the way offices are run in some cases."

"We give a very high level of support compared with the computing side of our business: our people are only one step short of being management consultants. Support costs are

very high and are growing. "We do train users but we also got a do-it-yourself training package for customers who want to do their own training. I think this is the way this side of the business will go."

Although growth of the processing business was the main reason for Wang's impressive results last year, word processing accounts for only 30% of its income. Some 5% and 10% comes from bureaux and the other 60% from its computer business.

The mainstay here is still 2200 small computer, introduced some 10 years ago, which brought more income last year than any other product yet.

But Wang's VS series of mainframes, announced late 1977, looks set to overtake 2200 in sales. In 1977-78 VSes were \$8 million. Last year they shot up to \$60 million. And next year Wang expects them to reach \$120 million.

The VS series is not comparable with the IBM 4300 with the recently announced VS-100 (CW, June 7) line-up against the 4300.

"IBM offers a lot of memory than we do but our systems have greater memory capabilities and are cheaper," said Wang. "The 4300s have a big operating system overhead so the IBM systems offer a better performance ratio."

Under development for more than two years, Reliance brings to the business market easy and efficient program development, rapid terminal response, data integrity and long-term growth," Ambidge explained.

Reliance is priced at £80,000 and is available now.

### DATA INTEGRITY

These new impact printers have solid horizontal character fonts, utilizing a continuous steel loop chain for band. Printing takes place along the contents of the 132 character buffer containing the data to be printed matches the character coming into position on the rotating band. Groups of characters are printed simultaneously on the same line so quickly that it appears that the entire line is printed at once. Since the font moves in a horizontal direction, the possibility of vertical registration of characters that produces wavy lines is virtually eliminated.

"We have been selling systems to 2200-type customers but in the last year we have put more emphasis on native accounts — the larger companies. We are getting into departments which want a system for a particular application."

What about an even bigger system to put Wang in the lead? "among the big boys?" asked Fred Wang. "You're not just installing hardware — it's a complete systems approach. You have to re-think the way offices are run in some cases."

"We give a very high level of support compared with the computing side of our business: our people are only one step short of being management consultants. Support costs are

Perkin-Elmer steps into the centre of the commercial data processing arena with the introduction of a new COBOL-based transaction processing system for all Perkin-Elmer 32-bit Superminis, including the recently announced Model 3220.

The new product, named Reliance, is an integrated software package consisting of COBOL, data management and transaction processing software. Reliance supports up to 128 transaction processing users and provides integrity, security and reliability.

### SYSTEM RELIABILITY

According to Marketing Manager, Gordon Ambidge, "Reliance is ideal for applications with a large volume of transactions, a variety of complex applications and when system reliability is crucial. Typical Reliance applications are found in the distribution, manufacturing and service industries."

"Under development for more than two years, Reliance brings to the business market easy and efficient program development, rapid terminal response, data integrity and long-term growth," Ambidge explained.

Reliance is priced at £80,000 and is available now.

### DATACOM

Reliance assures data integrity through unique automatic record locking, on-line transaction rollback and system-wide recovery features. Application programmers are freed from those difficult problems and can concentrate on the application solution. Test time is significantly reduced through facilities that provide batch simulation of anticipated transactions. With Reliance, each transaction requires only those resources unique to it, while terminal and data management components of the software are shared by all users at the same time. The result is an efficient system resource utilization and fast response.

### REPORT GENERATOR

Perkin-Elmer has also introduced RPG II, an easy-to-use, batch-oriented report generating facility for use with Reliance. The economics of data processing can be spectacular with certain industrial automation applications. This is especially true of the activities of Davy-Lewy Ltd, whose Systems Engineering Division designs special control systems for the process and metal industries, particularly in connection with the rolling and forming of steel and aluminium.

### INCREASED THROUGHPUT

Davy-Lewy's Vidplan automatic

shape control system, marketed by Lewy-Robinson of Bournemouth, uses a Perkin-Elmer minicomputer

to achieve dramatic productivity improvements in the production of aluminium strip, with throughput increased in some cases by as much as 25%.

Vidplan controlled rolling mills are in operation in America, Australia, Belgium, the Netherlands and Norway.

Davy-Lewy chose Perkin-Elmer for two main reasons according to Alan Foss, Engineering Manager. First, their minicomputers have a substantial price performance advantage over the competition. Secondly, since programs must be easy to maintain and very efficient, Perkin-Elmer's Assembler was found to be the best available against these criteria.

### SMOOTHER PRODUCTION

The heart of the Vidplan system is a device which continuously monitors sheet distortion during rolling.

Signals are fed back to the minicomputer which automatically adjusts the rolling profile or the mill to correct any developing distortion.

One of the unexpected advantages of this process has been a substantial speed increase in rolling.

Compared with human control of mills, the computer provides more consistent operation and therefore smoother production.

With continuing improvements in performance and reduction in costs, Perkin-Elmer minicomputers will play a major part in the growing industrial automation market in the 1980s.

### PERKIN-ELMER Computer Systems Division

227 Bath Road Slough Berks Tel: Slough 34511

The new big name in computers

## ISSUE NO 7

## DATA SYSTEMS NEWS

# Major advance in Vallance's data management on line

Leeds based electrical goods retailer, Vallance and Davison, are developing a computerised accounting, warehousing and merchandising system based on a Perkin-Elmer 7/32 minicomputer.

Vallance is a familiar sight in shopping centres in Yorkshire and the North Midlands. Dealing in electrical goods for the home, they run a chain of 24 shops and eight service centres, together with a thriving electrical contracting business spread throughout Yorkshire, Humberside, Tyneside, Lancashire and Merseyside.

Computerisation plans are extensive and are likely to take up to five years for full implementation. Following an evaluation by DIP Manager, Mike Nutter, it was decided that the greatest immediate benefit would arise from improvements in stock control.

### FIRST STAGE

This, therefore, is the first stage of what will be a fully integrated system running on the Perkin-Elmer 7/32 covering stock, TV rental and payroll accounting, ledgers, payroll value costing and electrical motor tendance contract files. Financial and other information from the centralised side of the business will also be integrated.

### POINT-OF-SALE

In addition to 20 point-of-sale terminals at the 24 retail branches, Perkin-Elmer video terminals are installed in the central warehouse, linked directly to the computer. Using a system of stock numbers, goods readable by OCR light pens, goods will be tracked from initial

order to delivery. Rob Hoogendoorn, Sales Manager, has been appointed and recruitment of sales support and engineering personnel is under way.

Address of the new operation is Perkin-Elmer Data Systems BV, Gebouw 70, Schiphol 1007 HT, Holland. Telephone 02-540791.

## Industrial Automation Group of the Department of Computing & Control

## Imperial College whose computing operations are a model for others chose a

## Perkin-Elmer Supermini to enhance their large-scale simulation facilities.

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# INTRODUCTION TO PASCAL

## Structure—and how to use it

### Part 4

SO far in this series, we have looked at the origins of Pascal, its novel data structuring facilities and the "nitty-grittys" of its grammar. It is now time to see how to write a Pascal program.

#### Define the problem

No matter what the language, the first task is to define and understand the problem. Complex problems benefit from special specification tools, but our Flexitime system is simple enough to be defined in English.

Employees in the firm of Blaze Inc can arrive and depart as they please while the gate is open, provided they take one and only one lunch break of at least half an hour. As yet there is no "Core Time" during which all employees must be in the building because the enlightened managers of Blaze consider this an unnecessary restriction. However the clock-on and clock-off times of all employees are monitored and periodically analysed. If it turns out that working patterns are becoming too diverse, Core Time might be instated. In the future, the working record of each employee might be filed, but at present the data is collected for statistical purposes only. Blaze wishes this to be done on a computer.

#### Attempting a solution

At the simplest level we need a program to read in clocking times, discard any which have errors or inconsistencies, and add the rest to a Statistics file. This system is shown in Figure 1.

We decide that times will be read into the computer every week, so we can envisage a stage where a Weekly file will be created as well. This would be sorted and used to update the proposed Work Records file. Finally, an Analyser program will be written by Blaze's statistics section to provide the board with some idea of the working patterns of its employees.

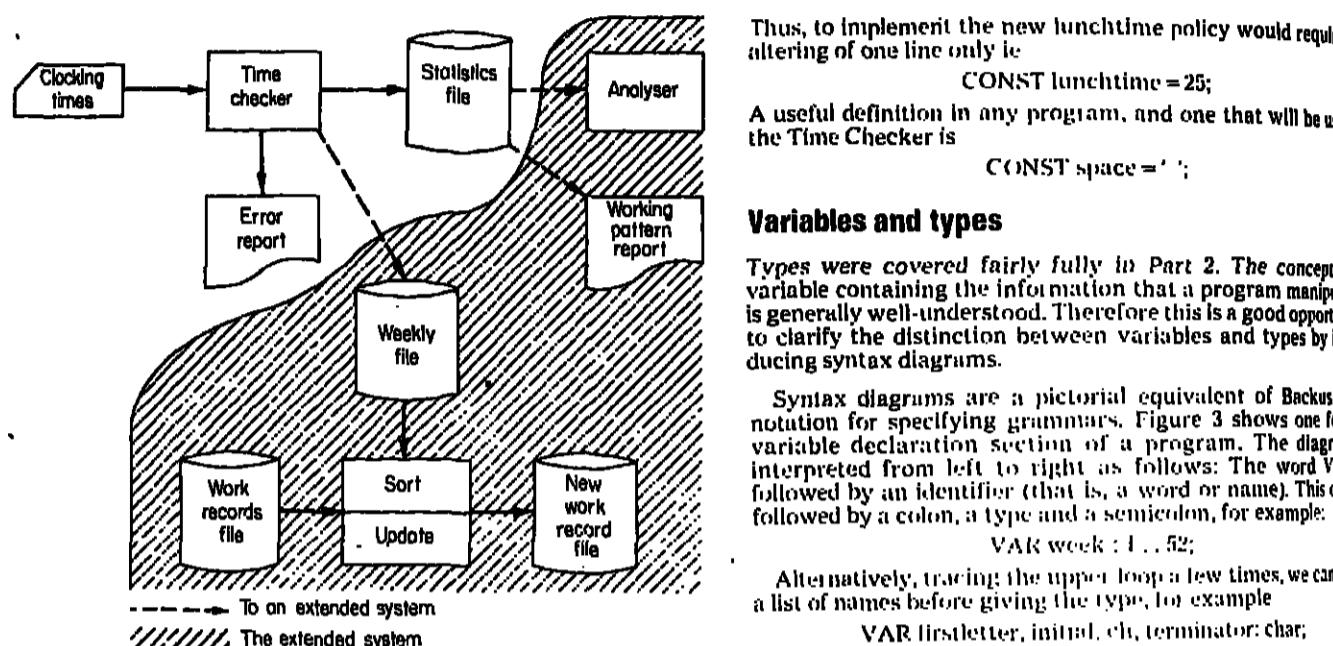
The next few parts of the series will be devoted to developing the Time Checker program, introducing most of the features of Pascal in the process.

#### The structure of a program

A Pascal program can have several sections as shown in Figure 2. The program heading is usually no more than a line long and includes the names of any files used by the program. Typically, these are the standard files input and output which are attached to the card reader (or equivalent) and the line printer, respectively. Time Checker has one other file at the moment so the heading is:

PROGRAM timechecker (input, output, statistics);

The next four sections are concerned with declarations, setting



#### Variables and types

Types were covered fairly fully in Part 2. The concept of variable containing the information that a program manipulates is generally well-understood. Therefore this is a good opportunity to clarify the distinction between variables and types by looking at syntax diagrams.

Syntax diagrams are a pictorial equivalent of Backus-Naur notation for specifying grammars. Figure 3 shows one for variable declaration section of a program. The diagram, interpreted from left to right, is as follows: The word VAR, followed by an identifier (that is, a word or name). This can be followed by a colon, a type, and a semicolon, for example:

VAR week : I..52;

Alternatively, tracing the upper loop a few times, we can get a list of names before giving the type, for example

VAR firstletter, initval, ch, terminator: char;

After such a list the lower loop can be followed by the declaration of another variable (or group of variables). Note, however, that this loop joins the main line after the VAR, implying that it cannot be repeated.

What is "type" in this diagram? It is the name of an diagram listing all the possibilities for types. These include subranges, records, and so on, as well as the name of a type, the above declaration to week could also have been done:

TYPE weeksunday = I..52;

VAR week : weeksunday;

The advantages of defining type names are the same as defining constant names: readability, documentation and maintenance.

#### At last — Statements!

The statements form that part which is generally regarded as the "program". The fact that nearly four parts of this series have been completed before they are mentioned reflects the emphasis on data structuring as an integral part of the design of any system. While one cannot go as far as to agree with L. E. Shampine, "Look after the data and the program will look after itself," the formulation of an algorithm can only be made after effort has been expended on data structuring. By now, it is clear that the reader is probably beginning to realise that this effort is well worth it.

The implications of this will become evident as our Flexitime system develops.

#### The inconstant constant

Every programmer must have come across a program (certainly not his own) which requires a major update because some constant which occurred throughout the program had changed. For example, suppose Blaze Inc. decided to reduce the compulsory lunchtime to 25 minutes. If the original 30 appeared as such in the program, each occurrence would have to be changed. Moreover, an Editor command such as "change all 30s to 25" would cause chaos by changing all other 30s (days in the month of June, for instance) as well.

In languages such as Fortran one is wary of assigning a name to a constant because this in fact sets up a variable and

IF(MIN2-MINI.L.E. LUNCH)GOTO RUSHD  
would, on most compilers, not be as efficient as

IF(MIN2-MINI.L.E. 30)GOTO RUSHD.

A Pascal constant definition assigns a name to a constant for the purposes of documentation, readability and ease of change, but to the compiler, it is still a number of character or whatever.

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SECTION	EXAMPLE
1. Heading	PROGRAM Itsname(itfiles);
2. Constants	CONST lunchtime:=30;" mins")
3. Types	TYPE hours=0..23;
4. Variables	VAR hoursworked : hours;
5. Procedures/functions	PROCEDURE settimestozero;
6. Statements	FUNCTION hoursbetween(t1,t2 : time) : hours;
	BEGIN
	hoursworked := 0;
	settimestozero;
	END.

Figure 2. Parts of a Pascal program.

#### What's New in Input and Output?

"Data Capture and Distribution"  
Friday September 21st at  
The Mount Royal Hotel, Bryanston Street,  
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Capturing Data.

For further seminar details contact NCC Tel: 061-2261333 (Val Cording) or 01-353 4875 (Chris Wall).

For bookings please telephone 061-2261333 ext 302.

(John Sather) and send a detailed and accurate  
cheque for £101.50 including VAT (NCC Members £81.50)

John Seth (315) The National Computing Centre,  
Oxford Road, Manchester M1 7BD.

#### NCC seminar

variablepart

VAR identifier type

Figure 3. Syntax diagram for variable declarations.

By Dr Judy Bishop

How to write a Pascal program — that is the theme of the fourth in Dr Judy Bishop's 10-part series, Introduction to Pascal.

Dr Bishop, a lecturer in computer science at Witwatersrand University, South Africa, has become acquainted with Pascal when she was studying for her PhD at Southampton University.

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NUMBER 96

INTERNATIONAL BRIEFING

**ICL wins £1m oil order**

ICL has won a £1 million order to supply two ICL 2904 computers to the Nigerian National Petroleum Corp. The tender for the computers was issued by the Japanese Chiyoda Company, the prime contractor for Nigeria's new Kaduna refinery where one of the 2904s will be installed. Chiyoda considered two Japanese computer suppliers before choosing ICL.

ICL sees the oil industry as one of its most promising markets worldwide and signed an agreement a few weeks ago with the British National Oil Corp jointly to develop systems for bigger 2900 series machines (CW, June 21).

THE most powerful general purpose mainframe computer in the world is now on offer from ICL.

Called the AS/8-7034, it is equivalent to a single processor Hitachi M-200H and Hitachi benchmarks indicate that it has a processing speed of 8 mips, million instructions per second, which compares with 4.7 mips for an IBM 3033, and is a little more powerful than an Attached Processor 3033.

Contrary to popular belief, it appears that ICL was intimately involved with Hitachi in the development of the AS/8 and the M-200H, and has had engineers working at Hitachi's Kanagawa plant in the foothills of Mount Fuji for three-and-a-half years.

It uses 550-gate ECL logic chips which ICL says are five times as dense, and at four picoseconds switch a little faster than those used by Amdahl on its largest machines.

Contra

to popular belief,

it appears that ICL was intimately involved with Hitachi in the development of the AS/8 and the M-200H, and has had engineers working at Hitachi's Kanagawa plant in the foothills of Mount Fuji for three-and-a-half years.

It can come with up to four CPUs, and ICL expects that similar architecture will be adopted by IBM in the forthcoming top-end H-series. A further feature of the M-200H is

not included in the AS/8, is an integrated array processor.

Particularly attractive to

users who have not already

installed plumbing is that, like all

the Amdahl machines, and unlike

the 3033, the AS/8 is air-

cooled.

The complexity of large sys-

tems and the shortage of

highly-skilled engineers makes

remote diagnostics a must, and

ICL is planning to open a centre

in Palo Alto, California, initially

to serve the US customer base,

to which all AS/8s will be con-

nected. First shipments are

scheduled for 12 months' time,

and ICL expects that IBM will

then have announced the H-s

eries. It therefore has not yet

placed the system.

ICL has also announced a

significant enhancement for the

AS/8-7032 Attached Processor

(CW, March 15) and renamed it the AS/8-7033 dual processor system.

The key new fea

ture is that if the master pro

cessor goes down, users can

manually switch the input

output channels over on to

the second processor, perform

initial program load and con-

tinue working while the failed

processor is repaired.

Meanwhile in Denmark,

a major financial restructuring

is likely to take place at Reg-

centralen, the national

manufacturer of small main-

frames and distributed proces-

sing systems.

The move marks a diver-

sification for Norsk Data,

since

Siemens to manufacture in South Africa

THE German company Siemens is to be the first multinational organisation to manufacture computer products in South Africa.

The company is to make its 6610 intelligent terminal system at either its factory in Pretoria or its subsidiary in Johannesburg, South African Technical Products.

The 6610 can have up to 48K bytes of memory and support seven screens.

a year. Annual demand for this type of terminal system in South Africa is estimated at around 2,000 units worth £12 million. Five South African companies also make intelligent terminals.

The 6610 is already exceeded by 100 and Siemens plans to produce 200

units.

It

uses

550-gate ECL logic

chips which ICL says are five

# INDIAN SCENE

## Delhi software firm goes into Europe

THE problems involved in trying to win international business from an Indian base have persuaded one of the biggest computer companies, Comptronics of Delhi and Bombay, to open offices in Brussels and Frankfurt.

"We would like to work in collaboration with European software houses, but we will also be seeking contracts from manufacturers and end-users," says Comptronics president Vivek Singh, who runs the Delhi end of the company while his brother, managing director Piyush runs the Bombay operations.

Comptronics is interested in both system and application software, and will be giving programmers tours of duty in the European offices once some contracts have been landed.

Comptronics, which now has a turnover of about £8 million, grew big by becoming the Indian agent for Electronorgtechnika, the Russian export agency, just at the time that the Indian government decided to expand computer business with the Soviet Union.

Russian computers installed in India have been paid for with system and application software, and Comptronics has done much of the work itself, although it has farmed out a substantial quantity to other Indian organisations which have installed Russian machines (CW, July 6, 1978).

The Russian connection has been extremely valuable to Comptronics, making the company the largest supplier of medium-scale computers in India. It has four machines of its own, an ES-1033 in Bombay, a 1022 in Delhi, a 1020 in Bhilai and a 1010 in Allahabad.

Comptronics intends to continue to act as Electronorgtechnika's agent, and has been commissioned to man the Russian organisation's office in Iraq which will maintain Rjiaj machines installed there.

"We would like to provide the same kind of support service for a Western manufacturer in the Far East," says Vivek Singh.

### ECIL micro under test

THE advent of the microprocessor has led to considerable growth in the variety of Indian-designed mini and microcomputers in development and manufacture. Our picture shows an ECIL Micro-78 microcomputer under test at the

early Insel of Italy on a pilot programme under which Comptronics would assemble 300 Mael 2000 or 1000 systems in Seepz for export to Yugoslavia.

There are also plans to build 300 Videoplex terminals in Seepz for the Hungarian computer manufacturer Videoton.

In a planned economy such as India's documents like manufacturing licences are extremely valuable commodities, and Comptronics has a letter of intent for computer equipment manufacturer. It is now seeking a suitable product.

"We are interested in manufacturing both in the Seepz free trade zone and outside it. In the latter case we would be looking for a product which would enable 70% of the output to be exported."

Discussions are at an advanced stage with Mael (form-

public sector company) near Hyderabad. Based on the Intel 8080A microprocessor, the machine shown here is destined for the Indian Institute of Technology in New Delhi, where it will be used for data logging.

## Maintenance company plans to diversify

TWO companies were born out of the ashes of IBM India. One, IDM, has become the Itel and Prime agent in India, is running the service bureaux left behind by IBM and, because of the calibre of its IBM-trained staff is respected and accorded a good chance of surviving, and is making a success of its declared aim of Western collaboration (CW, May 24).

Although it maintains an air of supreme self-confidence, the other company carved from the rump of the IBM India business is less highly regarded.

Called Computer Maintenance Corp, CMC, it is in effect the result of nationalisation of IBM's maintenance operations. It has the ambitious target of

handling maintenance of all computers installed in India, and is presently contracted to provide maintenance at 800 installations.

In addition to most of the machines left behind by IBM — the 370/155 at IIT Madras, one or two 360s, scores of 1401s and a few 1130s, 1620s, 7044s and 1800s — it is now under contract to maintain four Digital Equipment machines, two Robotron ES-1040s, three Burroughs machines, three ICL machines and some Inforex equipment.

It also has agreements to provide maintenance on future machines installed by CII-Honeywell Bull, CDC, Itel, Interdata and GCSS.

Now headquartered in

Hyderabad, it has ambitious (some would say unrealistic) plans to diversify into several other fields.

As a result, the memory is to be doubled to one Megabyte. But instead of calling in IBM or a plug-compatible manufacturer to effect the upgrade, CMC has decided to do the job itself. It is also developing add-on memory for the Eastern European machines installed in India.

Despite its age, the second generation IBM 1401 plays a vital part in the Indian economy, and CMC has plans to prolong still further the active life of the machines.

CMC is keen to collaborate with European companies on developing systems, software and applications packages.

**Reports by Tim Palmer**  
**Bombay company link with Wang**

A MARKETING tie-up with Wang and agreements with Rand Information Systems are two of the major coups for India's most ambitious computer entrepreneur Lalit Kanodia, and his company, Datamatics of Bombay.

At the top end, the new Solar

16/75 is the first SEMS mini to

offer one Megaword of main

memory, and is claimed to

approach the power of the

Digital Equipment PDP-11/70.

Fast memory, with a 375

nanosecond cycle time is available in 32K-word modules, and standard memory with a 625

nanosecond cycle comes in 64 or

128K-word modules. It is built

around twin buses which can

support up to four input-output

processors, and the virtual

storage operating system gives

the user up to eight virtual parti-

tions, each with a maximum

capacity of four Megawords.

There is also single and double-

precision floating point arith-

matics.

Up to four 50 Megabyte disc

drives can be attached, and real

time, transaction processing and

multi-task multiprogramming

operating systems are sup-

ported. Fortran performance has

been doubled over that of the

16/65, and APL performance by

30%. The Polybus offered with

Solar machines allows multi-

processor configurations to be

put together with no theoretical

limit on the number.

SEMS is aiming the 16/75 at

the scientific and technical mar-

kets, process control and com-

munications applications.

The 16/04 is a replacement for

the 16/05, and uses the same

CPU. It is extremely compact,

coming in two half-width

circuit boards, and is offered

with 32 or 64K-words of main

memory, which can be all RAM

or a combination of RAM and

programmable read-only mem-

ory. Languages now available

include real-time Fortran PL/18,

real-time Basic and APL.

Fast memory, with a 375

nanosecond cycle time is available

in 32K-word modules, and stan-

dard memory with a 625

nanosecond cycle comes in 64 or

128K-word modules. It is built

around twin buses which can

support up to four input-output

processors, and the virtual

storage operating system gives

the user up to eight virtual parti-

tions, each with a maximum

capacity of four Megawords.

There is also single and double-

precision floating point arith-

matics.

Up to 32 terminals can be attached to the CMC

7600, and an innovative feature is a multi-protocol,

multi-line communications processor.

Based on two Zilog Z80 microprocessors, and

developed by CMC in collaboration with the French

systems house TIT, the communications processor

can support simultaneous transmission on up to eight

## SEMS adds two minis to Solar line

EUROPE's leading minicomputer, SEMS of France, has confirmed the continuation of its two parallel mainstream computer lines with the Mitra 225 with two new models in the Solar 16 line, which bracket the three current

models, process control and communications applications.

The 16/04 is a replacement for the 16/05, and uses the same CPU. It is extremely compact, coming in two half-width circuit boards, and is offered with 32 or 64K-words of main memory, which can be all RAM or a combination of RAM and programmable read-only memory. Languages now available include real-time Fortran PL/18, real-time Basic and APL.

Fast memory, with a 375 nanosecond cycle time is available in 32K-word modules, and standard memory with a 625 nanosecond cycle comes in 64 or 128K-word modules. It is built around twin buses which can support up to four input-output processors, and the virtual storage operating system gives the user up to eight virtual partitions, each with a maximum capacity of four Megawords.

The balance is contributed by the Mitra line, which will be extended later this year with a powerful new model built using bit-slice microprocessors.

SEMS is still in process of establishing its UK subsidiary. It is already well-established on the West German market, where the Solar line predominates for historical reasons, and has also formed a Belgian subsidiary.

The UK subsidiary is to be headed by Douglas Mackenzie Bromley, formerly technical director of SEMS Computer Benelux.

Recruiting has been handled from the Thomson-CSF offices in Basingstoke, but SEMS Com-

puter UK will be headquartered in another, as yet unspecified, location. Staff have been recruited and are currently undergoing training prior to formal inauguration of the company, which is likely to be in August or September.

At the top end, the new Solar

16/75 is the first SEMS mini to

offer one Megaword of main

memory, and is claimed to

approach the power of the

Digital Equipment PDP-11/70.

Fast memory, with a 375

nanosecond cycle time is available

in 32K-word modules, and stan-

dard memory with a 625

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## French launch data entry system

A MAJOR new data entry system capable of handling a wide variety of other processing tasks has been introduced by CMC-France. It was designed and is being built in France for the European market.

The processor is a 286K-byte Digital Equipment PDP-11/34, and CMC is using Control Data fixed 80 Megabyte drives, up to four of which can be attached.

Up to 32 terminals can be attached to the CMC 7600, and an innovative feature is a multi-protocol, multi-line communications processor.

Based on two Zilog Z80 microprocessors, and developed by CMC in collaboration with the French

systems house TIT, the communications processor can support simultaneous transmission on up to eight

## INTERNATIONAL NEWS IN BRIEF

### Siemens opens a second micro centre in Germany

THE German giant Siemens has shown the importance it attaches to the need for training in the use of microprocessors by opening a second microcomputer training centre in Germany.

Sited in Düsseldorf, it complements the existing centre, opened in Munich in 1976, which already has given courses to over 5,000 users.

The US market for computers in general, and in particular for small systems, is so vast that it can provide enough business for a manufacturer with the right product to grow big quickly, without even looking for sales in Europe.

One firm that grew to nearly \$40 million in turnover before actively seeking European representation is Qantel Corp of Hayward, California, a company that claims to outsell NCR now in the small interactive business systems market in the US.

Qantel systems have been sold in Europe for about four years, but only in

the Netherlands and on a very limited basis in West Germany. However, the firm has now acquired a network of distributors covering most of Western Europe and is looking for substantial sales from established computer equipment suppliers like its UK distributor, General Computer Systems.

Factors that have contributed to Qantel's success to date include user oriented software, low cost marketing through carefully selected distributors and the leadership of the firm's president, Doug Baker, a Canadian who has transformed the California company over the last five years from a small terminal manufacturer into a

major contender in the commercial systems market.

Baker knows more than most about this business, having taken Management Assistance Inc into the interactive commercial systems market in the early 1970s by setting up Basic/Four Corp before moving to Qantel late in 1973 with the mission of doing a similar job — only better.

Here, Baker talks to Keith Jones of Computer Weekly about the past, present and future of Qantel and makes some interesting predictions about how hardware and software will develop over the next few years.

# Qantel poised to repeat success in European market

"THERE is one inviolate rule in Qantel — no hardware or software will ever be made obsolete."

Doug Baker expressed this commitment as a computer marketing man whose experience goes back to the 1960s when the computer business was very much manufacturer oriented. At that time he was selling accounting machines for a Canadian firm called SCM Corp which was later taken over by CDC.

"In the 1960s the customers of the computer firms that dominated the market then got

half as much as they wanted for twice as much as they expected."

Baker promised, "In two years Qantel will offer 16 Megabytes of main memory to its new and existing customers and they will be able to use up to 100 display terminals because the 16 Megabytes will eliminate contention."

Qantel's system design philosophy already weighs in favour of large memory capacities and dedicated user partitions rather than program swapping. The top end machine in the Qantel family, the 1450, already comes with

up to one Megabyte as standard. Asked about the processing capacity needed to utilise 16 Megabytes, Baker commented, "Our systems will have several processors by then and the 16-bit word length of our CPU is all that is needed in a commercial machine. Most of the work involves file transfers. The computation side is trivial."

Looking at another customer-oriented development just over the horizon, Baker explained, "The next major step is to eliminate downtime by the redundancy of intelligence. This dynamic redundancy will in-

crease the load on the rest of the electronics and degrade the performance of the system when something fails, but the machine will not go down. We know that we can achieve it and I am sure that it is essential for our survival in the small systems business, because it will enable service calls to be optimised."

When Qantel was in the terminal business it needed 80 service sites in the US to maintain equipment at remote locations."

Looking at software developments, Baker saw Qantel's recently acquired business planning system, Qicplan, as extremely important for remaining competitive.

"At the moment small business computers normally just report history, but in two years from now, Baker asserted, 'nobody will buy a business computer without planning tools.'

Qicplan, along with most of the applications software for Qantel systems, was developed outside the company, but Qantel itself has worked on its two essential software products, the Qicbasic compiler and the Best disc operating system, since September 1973 when Baker joined the firm.

"At Qantel we avoided what I am sure were mistakes made at Basic/Four. For example, Basic/Four adopted the indexed sequential file access method while at Qantel we went for the tree structured method."

About 35 of Qantel's directly employed workforce of 600 are currently involved with software development.

On the manufacturing side, the firm buys in all the peripheral units incorporated in

its systems, including disc drives from CDC and the Texan company, Western Dynex, and printers from Centronics and Teletype Corp, but Baker estimates that Qantel itself adds about 50% to the final value of the hardware.

The company builds its own controller, memory and PC boards, and its IC suppliers include Hitachi and NEC of Japan for 4K and 16K RAM chips. The ubiquitous AMD 2900 bit-slice processor chip set is now used in all Qantel models apart from the smallest machine, the desktop 210, which is configured around a Zilog Z80 8-bit microprocessor.

All manufacturing used to be based at Hayward until about a year ago, when a plant was opened in Puerto Rico, a location selected, according to Baker, because talented and industrious labour was readily available, and not because it was cheap. "Puerto Rico has the same minimum wage as the US," Baker pointed out.

The Puerto Rico operation is to be further expanded to help meet a growth in sales from \$36 million in 1978 to what Baker conservatively estimated will be a \$50 million turnover this year.

Qantel has been profitable since 1975, and the company's health is particularly important to Doug Baker because he has a substantial holding in the company — one of the reasons he was lured away from MAI, where he had no ownership.

Other major Qantel shareholders include Teledyne, a \$2 billion conglomerate that also owns 20% of Litton Industries, Arthur Rock and Co, the organisation that financed the

launch of Intel, and the Bank of America, the biggest bank in the world. About 200 Qantel employees also hold stock in their firm.

The company provides assistance for about half of its distributors and also quite a lot of money looking suitable international dealers.

Qantel took stand Hanover Fair earlier this year, specifically with the aim of making such contacts. The company spent \$70,000 booth at the National Computing Conference in New York.

The ES1000 series is the major current development. This is also referred to as the Rjedt unified range of mainframes, but I found that, at least in Bulgaria, this title is never used. Due to peculiarities in the Cyrillic alphabet the series is sometimes spoken of as the EC range, to add to the confusion. The ES machines were designed after the IBM 360/370 and will accept much IBM software without change.

A disc operating system essentially like DOS is found on the smaller machines of the range, ES1010 and ES1020, with OS/ES having the facilities of SVS on the larger machines up to ES1065.

Bulgaria's share in mainframe production lies in the medium range including ES1020, 1022, 1033 and 1035. The first two machines are equivalent to IBM 360/40 and have been in production since the early 70s at the modern and substantial plant, ISOT, situated on the outskirts of Sofia.

The ES10375 is its latest contribution and has marked similarities to the 370 series. Initial deliveries will be made within Bulgaria as replacements for its ageing ICL and other machines.

Two organisations I visited, the Institute for Organisation, Economics and Management of Construction, which runs an ICL System 4/80, and the Academy of Social Science and Social Management which has an ICL 1904A, expect ES1035 (or larger ES1045) replacements shortly. The Mechano-Electro-Technical Institute, also in Sofia, expects to replace its three ES1020s with ES1033s or ES1035s later this year.

Centralised planning is, of course, no new experience for Bulgaria. I met several examples during my visit. One of the most striking is the Institute for Organisation, Economics and Management of Construction which is part of the Ministry of Construction and Buildings.

Its computing centre provides the planning resource for management and design and is also seen as a model for the introduction of computer-based management systems into the construction industry. The centre itself contains an IBM 370/175, and an IBM 2705 communications processor, and is supported by a Danish RC3800 edit system. An ICL 550 is still running there, but is due to be

# Sofia centre of telecoms development



IN 1976 Dr KEN BEAUCHAMP visited Poland and described the emerging computer industry in the Eastern European countries in a Computer Weekly article, 'The Wind of Change Blows in Poland' (CW, June 17, 1976).

Now, three years later, during a second visit to another Comecon country, Bulgaria, he has found it even more difficult to separate developments there from the general situation in Eastern Europe: computer production and planning in Bulgaria form part of the overall Comecon effort.

Dr Beauchamp is director of computing services at Lancaster University.

and Viniti from Moscow.

Negotiations are also currently being carried out to link the source of Inis (nuclear data) and Agric (agricultural data), both located in Vienna, with CISTI via the International Research Centre at Luxemburg near Vienna (IASA) so that data exchange as well as updating can take place. This is a long-term project and likely to involve the Institute of Computing Techniques which holds the central role in network development.

IN the countries of East Europe, the members of the Comecon economic grouping, computer production and software development is now regarded firmly as a co-operative effort, supported by a high level of detailed planning and control.

The political core for this cooperation is the Central Committee for ES Production chaired by Professor Ilarionov, a corresponding member of the USSR Academy of Sciences.

Each Comecon country has its member and meetings are held twice yearly, by turn, in each member state. This is planning at its highest level which results in decisions on what is made and where.

The Institute of Computing Techniques in Sofia is the premier institute for communication software development. It is a large concern and responsible for much of the manufacturing design for storage devices produced at ISOT.

Under its director, Dr Zhivko Zhelezov, it has recently been given the task of setting up an experimental packet-switched network using the ES1022 as host and SM4 as node computers together with an unspecified number of terminals.

The problems they are meeting

lie in the operating system software for the ES range, which does not contain a mechanism for transfer of files in a network environment. Neither is the linking hardware very suitable. At present the system in the host permits the link to look like a terminal operating at maximum speed of 2,400 bauds.

A disc operating system essentially like DOS is found on the smaller machines of the range, ES1010 and ES1020, with OS/ES having the facilities of SVS on the larger machines up to ES1065.

Another body within Sofia which is actively engaged in network design is the Ministry of Posts and Telecommunications. A specialist working party has been set up, whose task is to initiate a national packet-switching network on the lines of the Post Office PSS.

Talks have been carried out with the French organisation Transpac but not, apparently, with UK Post Office officials. The initial purpose of the network will be to link the 27 districts of Bulgaria, corresponding to UK county councils, with terminals and host computers. The communications processor proposed is again an SM4, and some spin-off from the work of the Institute of Computing Techniques is expected. One major problem is the state of public telephone lines in Bulgaria, which is down to 1.2K bytes for switchable lines.

Centralised planning is, of course, no new experience for Bulgaria. I met several examples during my visit. One of the most striking is the Institute for Organisation, Economics and Management of Construction which is part of the Ministry of Construction and Buildings.

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replaced by an ES1035.

Applications software is dominated by finite element work, most of which is written by the centre's staff. Packages in use include Genesys, IBM IIS, and a Pert-like system. Compilers used are Fortran, Cobol and PL/I.

Much effort is spent on programs to solve particular problems in structural engineering, such as stresses in roads, bridges and dams, wind effects on buildings and earth tremor analysis — this latter of much interest to Bulgaria's neighbours in the earthquake zone.

Information control and dissemination is seen as the key to most of the technological and social developments required by the modern state.

Sofia is the home of one of the largest organisations of this kind in Eastern Europe.

The National System for Scientific

and Technical Information contains as part of its function the Central Institute for Scientific

Information and Management

(CISTI). CISTI assists in co-

ordination of computer work for Bulgarian scientific organisations, supplies technical and scientific information at all levels and, most important of all, runs an automatic system of information processing, storage and retrieval.

At present it runs an IBM 370/165 with rented IBM software. The database is composed from many sources. It includes Compendex from New York, Biosis from Philadelphia, Inspc from London, IIS and Agric from Vienna, and ICST

and Viniti from Moscow.

Negotiations are also currently being carried out to link the source of Inis (nuclear data) and Agric (agricultural data), both located in Vienna, with CISTI via the International Research Centre at Luxemburg near Vienna (IASA) so that data exchange as well as updating can take place. This is a long-term project and likely to involve the Institute of Computing Techniques which holds the central role in network development.

Some, in fact, bind you so tight that you can virtually kill your company choking to death.

If you've found this to be the case (probably with a faceless multi-million dollar operation) there are two things to do:

Firstly, don't renew your contract. Secondly, call Systime.

Being in the systems business ourselves we know the benefits of a flexible approach. As well as hardware we also offer a full range of software services and packages so you can easily fulfil your commitment without tying up capital and manpower in unnecessary development work.

If your current OEM contract is proving to be a financial bind, you know what to do. Call Systime.

What we are offering is:

- A realistic value-for-money hardware range with excellent delivery.
- A discount structure designed to help when turnover is small.
- Comprehensive service back-up from 12 UK service centres.
- Real sales help — Our OEM sales people will gladly help you with your clients, arrange visits to working sites and assist with exhibitions.
- With Systime you have access to many years of software experience, written either as packages or bespoke systems. Our demonstration and installation teams are also available to you at realistic prices.
- We can also help with short or long-term business problems. Remember that we've grown to a profitable turnover of £17m in 6 years so we've come across and solved many of the problems you're likely to encounter.
- Deal with Systime and you're dealing with flexible, sensible and sympathetic British businessmen — not a billion dollar corporate body.

For full details of Systime's sympathetic and flexible OEM sales and support services please contact John Arnold.

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**SYSTIME**

## Management reporting system Qicplan seen as 'winner'

QANTEL is fully aware that effective software is the vital ingredient in any formula for survival in the commercial systems market these days, and the company already offers a group of applications packages called Solutions and a report generation system called, predictably, Report Generator.

Murray pointed out that Qicplan only needs 16K bytes per user on a Qantel 1450 machine compared with the 100K per user taken up by Plancode on an IBM mainframe.

Even more important, perhaps, is that Qicplan models can be programmed using very simple forms technique, rather than by using complicated compiled language.

Qicplan has been used by some companies in Australia for up to three years and currently there include merchant bankers Hill-Solicitors, Wellcome Australasia, the Australian subsidiary of the UK insurance consultants Payne, and the largest consulting engineers firm in Australia, MacDonald-Wagner.

The specialisation is, of course, no new experience for Bulgaria. I met several examples during my visit. One of the most striking is the Institute for Organisation, Economics and Management of Construction which has an ICL 1904A, expect ES1035 (or larger ES1045) replacements shortly. The Mechano-Electro-Technical Institute, also in Sofia, expects to replace its three ES1020s with ES1033s or ES1035s later this year.

As with the mainframes, peripheral and component production is also allocated among Comecon countries. Bulgaria's storage devices and produces parts for the entire ES range. The specialisation is, through to other member states. All the newer VDUs I saw were manufactured in Hungary, and the EWS 2000 communications processor, and is supported by a Danish RC3800 edit system. An ICL 550 is still running there, but is due to be

Following the success of the 1978 IFIP congress in Toronto, Euro IFIP '79 will be Europe's most comprehensive computer conference.

More than 100 presentations from key experts and world renowned authorities. Some of the speakers are pictured above.

The conference will examine research and development, practical experiences and current problems in information technology.



## 'Government should consider splitting responsibility for telecoms even further'

OFFICIAL and business mail accounts for around three-quarters of postal traffic in North America and Europe. It is the most profitable part, since it is mostly collected from, and delivered to, the most densely populated centres of towns, where distances are shortest and both collection and delivery costs incurred per item are therefore lowest.

Yet the postal services are in grave danger of losing most of this traffic to the newest forms of inter-terminal electronic mail, facsimile document transmission, and communicating word processors (see Marketview, June 28), because of the growing unreliability of their services, and lengthening delivery delays, especially in international traffic. Recent mail posted from London has taken between seven and 10 days to reach Paris and Brussels, and up to two weeks to the US, longer than it took by sea in the 1920s.

postal mail within European countries, and within a known number of days in international traffic, the postal authorities are now looking for aid to the same method that their business clients might otherwise adopt directly electronic mail. Intelpost between London, New York and Washington is a first step in that direction.

As Table 1 shows, Intelpost is a hybrid service combining traditional postal methods of collection and delivery with electronic facsimile transmission. British senders have to hand in their Intelpost mail to one of three post offices in central London, or send it there from other parts of the country by ordinary mail. For urgent dispatches, Expresspost can arrange a special collection within the inner London area at an extra charge.

Either of the two US post offices, recipients may collect their Intelpost mail in person. Alternatively, it will be sent to

them by ordinary mail to any part of the US. Special messenger delivery is also available at an extra charge within the central Washington and Manhattan areas.

If and when the experimental free service is followed by a normal fee-paying public service, the UK Post Office is planning to charge a basic £4 fee for each dispatch plus £2 for each additional message sheet beyond the first. This fee will include normal postal collection and delivery — or Poste Restante — at each end, with additional Expresspost charges for special messenger collection or delivery within the inner London, Manhattan or downtown Washington areas.

Since automatic sorting equipment has been powerless to restore the reliability of guaranteed next-day delivery to

## MARKETVIEW

BY FRED LAMOND

Short of last minute technical or political hitches, this week will have seen the start of an interesting experiment in public electronic mail: the Intelpost service of high-speed facsimile document transmission by satellite wideband link between the Stock Exchange post office in London, the World Trade Centre post office in New York, and the Capitol post office in Washington, with ordinary mail or special messenger collection and delivery at both ends.

Initially, the experiment will be free of charge to a small number of selected busi-

ness users. Determined opposition from telecommunications common carriers makes it still uncertain whether it will follow by a permanent fee-paying service. Similar political battles are holding Intelpost services to and from Paris and Brussels.

In this Marketview, Fred Lamond discusses the reasons for Post Office interest in electronic mail, and for the determined opposition of both private and public telecommunications common carriers to this venture.

(which must be A4 size) are inserted into a Rapicom facsimile transmitter, which takes from 10 to 40 seconds to scan each A4 page and convert its contents into a 512K to 2MB bit stream, depending on the sheet's contents. The bit stream is transmitted at 50K bps via the Intelsat IV satellite to the Capitol post office in Washington, or onwards via a terrestrial microwave carrier to the World Trade Centre post office in downtown Manhattan, where a photocopy of the original appears almost simultaneously with the transmission from London.

Intelpost should thus meet considerable need in the business community and be successful if it is allowed to get the ground, in the face of considerable political opposition. That is to meet from telecommunications common carriers in the US and continental Europe and Belgium.

In France, as in the UK, the Post Office and Telecommunications are the responsibility of separate general directorates within the same State Secretariat for Posts and Telecommunications (P&T). which is still run as a government department. The general directorate for the Post Office (DGP) had assumed itself to be the US Postal Service's natural partner, and had as far back as last September's Sibc named May 15, 1979 as the opening date of the free trial service to New York and Washington, and July 1, 1979 as the beginning of the fee-paying service. An Intelpost office is ready at the Porte Maillot in Paris.

But Intelpost will also cost less

than airmail for the same documents, but take only 24 to 48 hours from sender to addressee, or even less than an hour if the addressee collects the package himself from the destination Intelpost office, or uses special messenger delivery.

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## S. Africa sets up DP school

A COMPUTING school has been set up in South Africa to help combat the acute shortage of programmers.

Called Impala Computing, the school has been established by Greek computer specialist Dino Aravindinos and runs four-month courses designed to teach the student the main aspects of programming, including hands-on experience on an IBM System 34.

Aravindinos claims that his school is the only one of its kind in South Africa, and that "the students are supervised by another student who proved himself in the previous month's intake and who is further overseen by highly qualified tutors."

Attributing the country's massive shortfall of trained programmers to emigration — particularly to Australia and Canada — and to local companies which are not prepared to employ inexperienced people and train them, Aravindinos suggests that his school will alter the situation by giving students the skills required.

Applicants for enrolment at the multi-racial school are put through a pre-selection course.

### Mark III centres

GEISCO has added two more centres to its Mark III time sharing service in Riyadh, Saudi Arabia, and Caracas, Venezuela. The Riyadh centre takes the form of a walk-in bureau, but access to the service by local telephone call is now possible from over 800 cities in 24 countries. Other Venezuelan cities will gain centres next year.

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# COMPUTER WEEKLY INTERNATIONAL

## New Zealand claims world's biggest 2900

THE New Zealand government is due to become, once again, the proud possessor of the biggest ICL 2900 in the world.

Over the next few months, the 2900 at the Trentham computer centre, in Wellington, will get a £2 million upgrade to the dual processor, despite pressure on the government to prune spending. Many other upgrade requests are expected to be deferred by the government.

Trentham is one of the government's four major installations, each handling the requirements of several departments — and each, incidentally, supplied by a different manufacturer. New Zealand central government might be seen to be "hedging its bets" in hardware, with processors from IBM, ICL, Burroughs and Univac.

The 2900 already processes work for the

Agriculture and Fisheries, Forestry, Statistics and Scientific and Industrial Research departments. The rapid growth of this workload is the prime motive for the upgrade, says Trentham centre manager Brian Gibson.

Under development, however, is an online system for the Customs Department, which will become one of the centre's major applications in the early 1980s. This will use the latest version of the IDMS database system, with its teleprocessing enhancements, running under the 5X32 version of the VME/B operating system.

Operation under 5X32 will start on the new processor when this goes live in mid-July. For about three months the configuration will run in "twin" mode, with the older processor still running the 5X27 release.

The 2900 was the largest in the world when originally installed, but was soon overtaken. ICL has confirmed that with the latest upgrade, Trentham regains its leading position.



## Into Arab territory

TRANSBORDER data flow could cause the loss of 23,000 data processing jobs in Canada by 1985, mainly because an increasing number of US-based companies will hold files on large scale systems at head office instead of on smaller computers at their Canadian subsidiaries.

This prediction has been made in a report by the Canadian Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty. The report also warns that various kinds of data will be placed beyond the protection of Canada's privacy and freedom of information laws, and sees the danger of computer crime deterrence and detection being reduced in effectiveness.

In addition, it warns that the greater use of US and other foreign computing services could undermine domestic control over disruptions caused by strikes.

Another danger that the

report foresees is a greater dependence on foreign technicians which could reduce the overall pressure to develop computer systems for domestic needs.

Canada's domestic telecommunications system could also be neglected, according to the report, by data being imported into Canada via foreign owned satellites and rooftop antennas.

One way of creating a lot of new data processing jobs, according to the report, could be the heavy promotion of Telidon, the Canadian government's videotex service (CW, April 12).

CONSISTENTLY big exporters, Rediffon Computers has installed its data entry systems in some exotic locations. And the company has been quick off the mark in the Persian Gulf. Our picture shows a Rediffon R880 system installed at the Qatar Petroleum Producing Authority in Doha, Qatar. It will prepare tapes for processing on an IBM 370/115 mainframe at Petroleum Dev-

elopment, Oman and the R850 handles invoicing, materials control, salaries, general accounting and personnel.

Rediffon has also sold its first R850 in the USSR. The customer is V/O Prodintorg, which will use the system for administering its food import-export business, which includes caviar, tinned fish, thoroughbred horses, pedigree cattle and zoo animals.

## Itel offers most powerful mainframe

From page 17

processor is being serviced. This is not at present possible on IBM's attached processor system.

In addition, it warns that the greater use of US and other foreign computing services could undermine domestic control over disruptions caused by strikes.

Another danger that the

IBM is making its first European delivery of this product.

West Germany is a bright spot in the financial gloom surrounding Itel's business. Citing the speed with which Itel was

able to come up with the answer to the E-series, Itel Germany expects to report a 50% increase in turnover for the first half of 1979, just closed, to around DM 30 million.

Itel calls the machines the AS/700 and AS/700, and they are offered as direct alternatives to the IBM 3431. The 7020 is claimed to match the power of the 3431, while the 7030, offered as a field upgrade, provides 40 to 50% better performance, and main memory of up to eight Megabytes, double that on the 3431.

Full microcode assists for VM/370 and OS/VS1 are included in the two models, and Itel promises to provide DOS/VSE Assist within one year of

its formal launch of the IPL Systems Model II and III IBM-compatible processors (CW, June 14). These machines are the top two models in the line marketed in the US by Control Data.

The channel subsystem for the AS/6 and AS/7 has also been enhanced, and in particular now supports IBM's new 3370 disc storage subsystem. The 3370, announced with the 4300, provides 570 Megabytes per spindle, making it the biggest drive currently offered by IBM.

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# Appointments

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If you are able to offer at least two years' experience of a real-time high level language ideally CORAL 66 or ALGOL, then this is an excellent opportunity to join the software development of significant new products in the radio navigational systems area.

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*Excellent opportunity to work in Scandinavia on new technology projects*

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- \* **TECHNICAL CONSULTANTS** - with upwards of 5 years software design and implementation experience.
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Contact: Margaret Stevens

For further information on any of the above vacancies, please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

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*We are keen to hear from Analysts who have a sound business background, a good knowledge of COBOL and experience of system design over two to three years, ideally in an accounting, financial or banking environment.*

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## Programmers & Analyst/Progs.

**South Midlands** up to £6,500  
We have been retained by a well known manufacturing organisation to recruit a number of Analyst/Programmers and Programmers to work on the development of commercial systems in a dynamic and expanding environment.

There are vacancies at several levels but all applicants must have a sound background of COBOL on a mainframe, (at least one year for the junior positions and three years for the more senior posts) in commercial applications preferably manufacturing, stock control or accounting.  
*This is a real opportunity to work in a friendly and professional installation. Salaries are negotiable according to experience. Relocation assistance available where appropriate.*

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**Mid-East Beds.** to £8,000 p.a.  
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The D.P.M. believes strongly in giving his staff all-round systems responsibility, so once the successful candidates have proved their worth, complete projects are likely to be assigned.  
*Competitive salaries, regular merit and cost-of-living reviews, a bonus scheme, "in-house" swimming pool and sports facilities plus full relocation, all form a package well worth working for.*

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SDI, the largest independent DOS, DOS/VS and DOS/VSE System Software Company in the world is looking for bright individuals to join the Technical Services group at its High Wycombe (Bucks) Development Centre.

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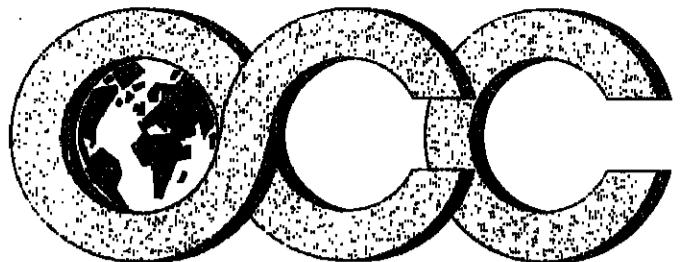
If you possess some or all of the following skills and abilities:

- Are a bright self-starting individual able to get on with the job with minimum supervision.**
- Consider yourself to have a good understanding of DOS/VS and IBM System/370.**
- Have had some programming experience (Systems or application).**
- Have had some experience with GRASP or GRASP VS (desirable but not a pre-requisite).**
- Have had some operating experience (desirable but not a pre-requisite).**

then why not call Robin Bailey on High Wycombe (0494) 20947 between 09.00 and 17.30 weekdays to find out how SDI can help your career, or complete the coupon and send it to: **SDI, PO Box 84, High Wycombe, Bucks.**

Job in site

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ADDRESS	
Bus. Tel. No.	Home Tel. No.
CURRENT JOB TITLE	
POSITION APPLIED FOR	



# GRACE

c. £20,000

■ Based at either of the data centres—Epernon (France) or Worms (Germany)

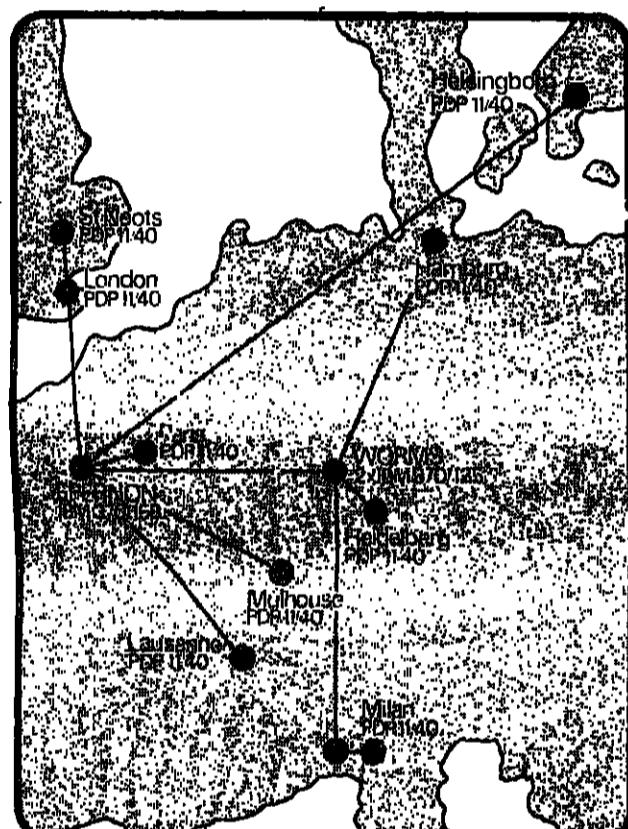
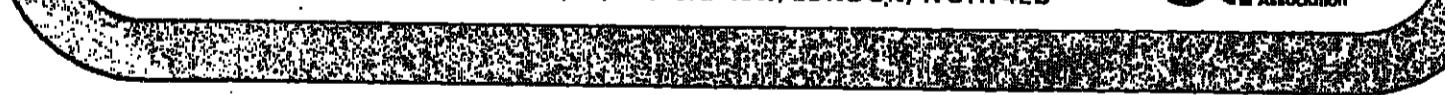
The person appointed will take charge of all hardware and software matters relating to the mainframes at both data centres; the terminal computers; and the TP network. The functions include: evaluation of hardware and software alternatives; trend analyses; performance monitoring; development of standards and procedures; day to day software support with a team of systems programmers. The current hardware is shown on the map, but a major upgrade is planned for the near future, involving 2 x IBM 4341's at Epernon and 2 x IBM 4341's at Worms to replace the IBM 370's, and 13 x IBM 8100's to replace the PDP 11's. The software environment includes DOS/VS, POWER/VS, VM, DL1, CICS, etc on the mainframes and RSX11M, DECNET and SERIES IV on the PDP 11's.

Candidates must be thoroughly competent technicians in the appropriate fields and must also have excellent managerial skills. The position will involve travel between the various sites in Europe and candidates need the personality which will allow them to cope with the pressures involved. English is the working language, but knowledge of a European language would obviously be beneficial.

Client interviews will take place at our offices on Tuesday 14th and Wednesday, 15th August. Final interviews will take place at Epernon or Worms soon after.

Please ring Neville John on 01-242 9356 (day) or write to the address below, quoting ref: 748/CW/NJ. If it would be more convenient to telephone in the evening or during the weekend, ring Farnborough (Kent) 52880.

OCC Computer Personnel Limited, 16, Bedford Row, LONDON, WC1R 4EB



**Specialists since 1971 in UK and International computer appointments. We have many other jobs on our files and offer a career counselling service to computer professionals.**

Our client is W R Grace, the multinational company manufacturing and marketing a wide range of industrial chemicals. Worldwide the group sales exceed £4,000 million and in Europe there are manufacturing or marketing sites in most countries. A computer network links these sites and there is now a vacancy for the key position of

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any of the following...

- TURNKEY COMPUTER SYSTEMS
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... and produce results to justify earnings between £12k and £15k plus a car and other benefits?

Then, suitably qualified men or women should write in strict confidence, enclosing a c.v. and indicating any preference for a Midlands or London location.

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Executive & Professional Recruitment  
GP House, 155 Hamstead Road  
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## MANAGEMENT SERVICES DEPARTMENT

The City Council operates an ICL System 4/50 and a Univac 1100 with terminal network on a two-shift basis. We now require the following staff to work in the operations area:

### Computer Operator

£6265-£6769 (under review) Grade AP4 (Ref. MS2). The successful candidate will preferably be an experienced System 4 operator, but a Univac 1100 or IBM background would be considered. Minimum requirements are 5 O' level (including English and Maths) and 3 years' experience in computer operating.

### Junior Computer Operator

£4407-£6002 (under review) Grade AP1 (Ref. MS2). The successful candidate will preferably have at least 5.0 hours of data processing. He/she will also be expected to have a basic understanding as to what areas a computer could be used for within a Local Authority.

Both these posts are in a career progression scheme where advancement is based on performance, experience and achievement. Training will be given where appropriate.

There are excellent benefits including—

- up to 24 days' annual leave, PLUS an extra day off every four weeks
- interest-free annual season ticket loan
- subsidised canteen
- close to Victoria main line, tube and bus terminals.

To obtain application form please send postcard, telephone or call at the Personnel Management Division (quoting appropriate reference number), PO Box 240, WESTMINSTER CITY COUNCIL, City Hall, Victoria Street SW1E 6QP, telephone number 01-834 8986 (24 hour answering service). Closing date 2nd July, 1979.

### HERTFORDSHIRE COUNTY COUNCIL

#### COBOL PROGRAMMERS

Salary up to £6188 p.a. (at present under review)

Vacancies exist for experienced programmers to work in the Data Processing development team. The latest NCR Criterion range of 1 Mbyte 8580 computer with large disks, fast tapes, and terminals, providing virtual storage and interactive programmes facilities is now installed.

A wide range of applications are in use, serving the needs of most departments within the County Council. The schedule of new development looks towards the further growth of the on-line and information systems world.

Candidates should have had one year's successful programming experience, preferably in COBOL.

We offer a parallel career development for Programmers and Analysts with a progression scheme to accelerate you through the salary scales.

Generous holidays, an attractive contributory pension scheme with a wide range of benefits, ideal working conditions — new offices and staff restaurant — and a range of sporting facilities.

Renovels, disturbance and lodging allowances payable in approved circumstances and assistance with housing may be given.

Applications (no forms), giving full details of past experience, age, and present salary, should be addressed to the County Treasurer, County Hall, Hertford, Hertfordshire SG10 1JH, by 30 July, 1979.

**HAWKER SIDDELEY**  
**Brush Electrical Machines Ltd**  
**Computer Programmers**

We have vacancies for two Computer Programmers. Ideally applicants should have knowledge and practical experience of commercial programming particularly in COBOL, or a degree in computer science.

However we will consider applications from graduates in other preferably related disciplines who can demonstrate a keen interest in a career in computers.

We offer an attractive salary coupled with conditions commensurate with a large and successful company.

Please contact Mr. D. G. Dewick, Assistant Personnel Officer, Brush Electrical Machines Limited, P.O. Box 18, Falcon Works, Loughborough, Leicestershire, Telephone Loughborough 63131 ext. 64.

**LANCASTER POLYTECHNIC AT COVENTRY**  
**FACULTY OF APPLIED SCIENCE**  
**Department of Computer Science**  
**TEMPORARY LECTURER GRADE II**  
**£14101-£16558**  
**(TENABLE FOR 1 YEAR ONLY)**  
**THE JOB will involve teaching Programming and Data Processing HND and Degree level**  
**THE PERSON should have recent practical experience of Computer Systems and/or a degree in Computer Science. Previous teaching experience would be of considerable advantage.**  
**For application form and job specification, please apply in writing enclosing a self-addressed envelope to the Personnel Office, Lancaster Polytechnic, Priory Street, Coventry CV1 5RL, returnable by 3rd August, 1979.**

**OUR REPUTATION TELLS ALL**

## To run a new PDP11/70 installation

These two Shift Leader appointments are undoubtedly among the most exciting and interesting around today. Our client is an internationally famous London based company with a £30 million turnover. It's growth in recent years has been impressive, to say the least, and now in order to keep pace with a rapidly expanding demand for its services, it has installed a brand new PDP11/70 computer running under RSTS/E with 17 on-line terminals in-house and four remote.

It is a fully documented and supported time-sharing system which also covers the company's integrated accounts, sales

records and archives. In our client's line of business it is a unique application and now with the system all set to go they require two young, enthusiastic and ambitious Operations Shift Leaders.

It is an ideal opportunity for men and women who are at present Chief or Senior Operators and are now looking for more responsibility and a new challenge.

PDP 1100 under RSTS is required and a grounding in BASIC + would also be desirable, but as an added attraction to the jobs, training in BASIC + programming will be given.

Salary will be negotiable up to £6000 per annum and our client is also offering membership of the pension scheme and staff restaurant facilities with a three-course meal for only 20p.

Phone or write to Andy Mogg for an application form, or send your c.v. to the address below.

### Knight Computer Services Ltd.,

14 Old Park Lane, London W1H 4JL  
Staffordshire, Cheshire, Lancashire, Scotland, S.E. England,  
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OR WHITBURY 051 408025

**0702 61551/2 TASK FORCE 0782 410217/8**

Computer Consultancy Services

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<b>IBM</b>	OS JCL WRITERS	£235 + pw	YORKS AND LANCYS YORKS
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	VME/B VERY GOOD OPS	£NEG pw	MIDLANDS
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	DME SUPPORT	£225 pw	WEST
	2900 PROG/ANALYSTS	£250 + pw	
<b>HONEYWELL</b>	PROGS COBOL, & IDS	£275 pw	LONDON & OTHER AREAS
<b>UNIVAC</b>	1100 COBOL PROGS	£250 pw	WILTSHIRE
<b>MINI</b>	PROG/ANALYSTS	£NEG pw	SOUTH WEST
<b>CONSULTANTS</b>	MULTI MACHINE DISCIPLINES	£275 + pw	NORTH & SOUTH

More contracts are imminent. Permanent positions with **TASK FORCE** will be considered for all requirements listed.

in our new Stoke Office (Jan, Paul or Derek)

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Telephone: Southend-on-Sea (0702) 615651/2

**OUR REPUTATION TELLS ALL**

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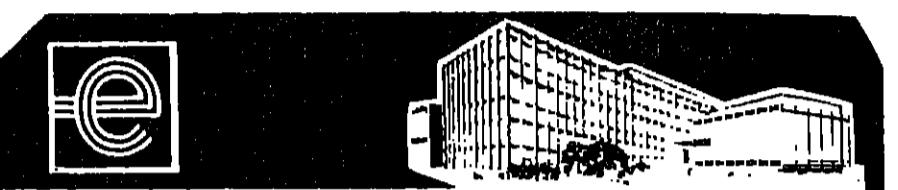
To cope with the demands of our Electronic Point of Sale Project (EPOS), we require Programmers at all levels. Ideally you will have a minimum of one year's IBM experience with COBOL or Assembler.

Salaries will be within the range £5,000 p.a. to £7,500 p.a. and fringe benefits are those that you would normally associate with a large Company.

We are based in Cheshunt, 36 minutes from the centre of London, and where necessary we will help with relocation expenses.

For more information about these positions contact Fred Rayers, Computer Services Manager, Tesco Stores Ltd., Delamare Road, Cheshunt, Herts. EN8 9SL. Telephone: Waltham Cross 32222.

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the new leaders...



## TECHNICAL OFFICER (COMPUTER APPLICATIONS) Applied Physics Division

### MATHEMATICS SECTION

The successful candidate will join a team in the Mathematics Section whose work covers a range of research areas in addition to providing a mathematical service within CERL. He/she will work closely with Research Officers engaged on a number of problems for which numerical and computation solution plays a large and important role. In addition he/she will contribute to the mathematical and computational service provided by the Section.

Applicants should ideally possess an HNC or equivalent qualification and at least two years experience of computer programming. The duties of the post require ideally a good understanding of mathematics and numerical analysis, together with a knowledge of a range of computer languages and modern programming techniques.

The appointment will be made within a salary range of £4110 to £6035 (currently under review) plus a payment under a Self-Financing Productivity Scheme between £10 and £15 per month.

The Laboratories are situated in a pleasant part of Surrey and offer attractive Conditions of Service, and facilities for the total of 800 Research and Support Staff engaged in a broad spectrum of research into the materials, technologies and plant performance problems of the Central Electricity Generating Board.

Application forms are obtainable from the Head of Personnel Development & Services, Central Electricity Research Laboratories, Kelvin Avenue, Leatherhead, Surrey KT22 7SE or telephone Leatherhead 74488 Ext. 363, quoting reference number RL/37/CW. Closing date is Friday 3rd August, 1979.

CENTRAL ELECTRICITY RESEARCH LABORATORIES

NATIONAL ENVIRONMENT  
RESEARCH  
COUNCIL  
NERC CENTRAL COMPUTING  
GROUP

### ASSISTANT SCIENTIFIC OFFICER

The NERC Central Computing Group has a vacancy for an Assistant Scientific Officer to work at the Rutherford Laboratory, Chilton, near Didcot, Oxon. The post involves providing general user support to the University members. Specific responsibilities include support of existing major software systems, fault finding and job tracking when problems arise.

Minimum educational qualifications for appointment are G.C.E. O Level passes in Mathematics and English Language or a Scientific/Mathematical subject. Candidates should normally be under 26 years of age on 31st December, 1979. Salaries range from £3,090 p.a. up to £3,690 p.a. at step 21. £3,188 p.a. at step 22 rising to £3,818 p.a. (As at 1st August 1979). These scales will be reviewed in January 1980.

Daily travel facilities are available from the Rutherford Laboratory to most of the neighbouring towns and villages. Residential and recreational facilities are provided.

Staff of the Council are not Civil Servants but enjoy pay and conditions of service comparable with Civil Servants.

Application forms may be obtained from Ken Young at NERC, Polaris House, North Star Avenue, Swindon (Tel. 0793 40101). Completed forms should be returned by 10th August, 1979.

Application forms and particulars are available from:

The Personnel Officer,  
Arus Slainte,  
11 Patrick Street,  
Kilkenny,  
Ireland

Telephone (056) 21702.

GRADUATES

to whom completed application forms should be

returned not later than 5.00 p.m. on Tuesday 31st

July, 1979.

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Urgently required to Trainee positions. Industrial, scientific and Commercial situations.

SALARIES c £3,000  
ALL AREAS

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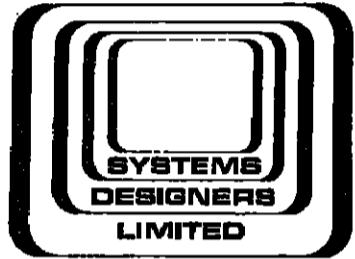
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Systems Designers Limited formed its Manchester Branch in Autumn 1978 and due to a full order book, requires further computer professionals

Applications are currently in hand in the Communications, Viewdata, Scientific and Process Control fields

Staff are required at all levels for these interesting projects which use the latest mini and micro computers. If you have one to eight years' real-time experience and would enjoy the challenge of helping our branch grow at an even faster rate, please contact:



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Systems Designers Limited  
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Woodlands Road  
Altringham, Cheshire WA14 1HG  
Telephone: 061-928 9305

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Top Ops. Rely on Knight for advice and development as well as the best jobs!!! Call Sue, Jane or June now!!	

All vacancies are open to both male and female applicants.

**Knight**

Phone anyone, or for an application form leave your name and address with our answering service.  
**Knight Computer Services Ltd.,**  
14 Old Park Lane, London W1Y 4NL.  
Staff Services Division of BOC Database Group and  
a member of Computing Services Association.

**01-491 4706** OR WHEN BUSY 01-439 3411.

# European Arab Bank Limited

## Analyst/Programmer City

c. £7,000

A leading international bank requires an analyst/programmer to join a small team working with a CTL computer. The job involves investigating, specifying and programming banking systems on a CTL 8050 computer.

The successful candidate will have at least 1-2 years' experience in COBOL programming or mini computers.

In addition to a highly competitive salary, the bank provides excellent fringe benefits including house mortgage scheme, non-contributory pension scheme, BUPA and luncheon vouchers of 75p per day.

For further details, please contact Sue Arnold on 01-606 6099.

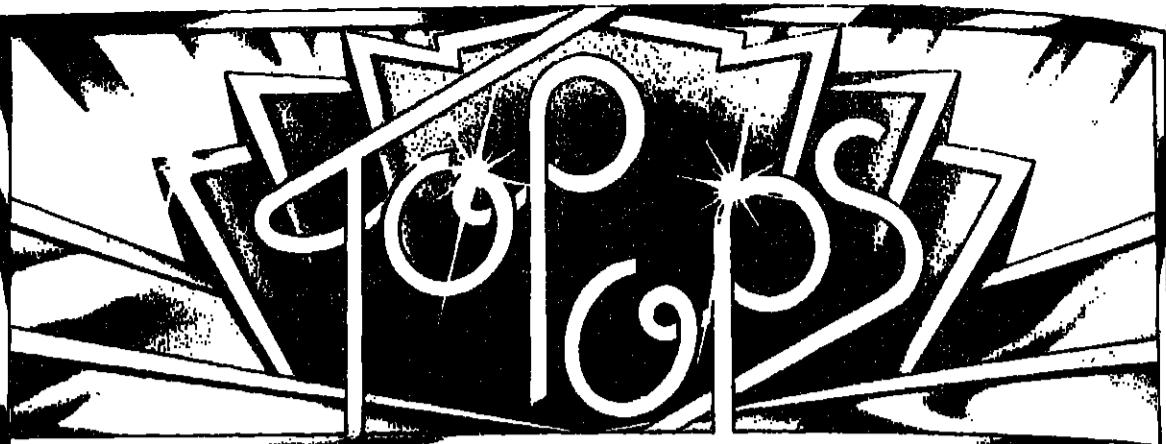


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All classified copy should reach our offices no later than 5.30 p.m. on the Monday preceding Thursday's publication. If complete artwork is supplied 12 noon on a Tuesday.

Ring David Abbey for further details on 01-261 8016.



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## CENTRAL LONDON

c. £6,900

Acting for a large West End ICL installation, we are recruiting for a management post with sound career prospects, in a well-organised environment with good working conditions.

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You would be responsible for operating a large ICL 2900 configuration under VME/B. There is substantial use of communications, including both TP and MAC, and IDMS is being introduced.

You should have had significant supervisory experience of major operating systems in a communications environment and about five years' operations experience in total. While 2900 and VME/B knowledge is highly desirable, candidates with a background on other large mainframes will be considered and necessary training provided. (Ref. 999)

Please ring us for a preliminary confidential talk, quoting the appropriate reference, or leave a message on our answering machine after hours and we will contact you.

**EDP SYSTEMS 01-637 5796**  
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We need a  
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our programmers can depend on  
because a lot depends on them.

As vital members of the Airborne Software Division of Marconi Avionics, they're working on and contributing to the software behind some of the world's most sophisticated electronics systems.

It's a lot to ask of any Programmer - experienced or otherwise. They need support. They need someone to turn to: someone who can offer them an educational service that keeps pace not only with their own careers but with technological development of their specialist interests as well.

These interests cover software design techniques, languages, real-time programming, microprocessors - indeed the whole gamut of advanced programming - and this enlightened man or woman will need the experience to develop and conduct courses covering all of them.

But experience isn't all we're looking for. The ability to communicate effectively with small groups of Programmers is equally important. We're not going to put a value on your contribution at this stage. Suffice it to say that we will pay whatever it takes to attract the sort of Software Lecturer our Programmers can rely on - and we'll back the salary with a full range of big company benefits.

For full details, please write to Chris Hill, Marconi Avionics Limited, Elstree Way, Borehamwood, Herts WD6 1RX. Telephone: 01-953 2030 ext 3449 or call 01-207 3455 any time.

**MARCONI AVIONICS**  
A GEC-Marconi Electronics Company

UNIVERSITY OF ABERDEEN  
DEPARTMENT OF COMPUTING SCIENCE

Applications are invited for the post of  
**LECTURER**

Candidates will be expected to hold a good honours degree in Computing or a related discipline and have at least three years relevant postgraduate experience.

PREFERENCE may be given to candidates with experience in business data processing or microprocessors and communications.

Please apply for full career details to: Ms. Zulie Mohammed, IBM United Kingdom Limited, 28, The Quadrant, Richmond, Surrey TW9 1DW, quoting ref: C.W./020420

Further particulars from: The Secretary, The University, Aberdeen, from whom applications should be lodged by August 5th, 1979.

Capital Appts.

FORTRAN

Programmers urgently required for scientific development.

£3,600-£8,000

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## Tooting, S.W. 17.

### From, £5,000

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The essential requirements for this position are at least two years Data Control experience, preferably in a supervisory role, plus a working knowledge of GEORGE III JCL. The successful candidate will work on a 2-shift basis and be responsible for the supervision of a 4-strong team. The salary quoted includes London Weighting and a 20% Shift Allowance.

For further details, phone Sylvia Lyons or Les King on 01-839 3351 up to 8.00pm each evening, or write, with comprehensive career details and telephone number, to: Modem Computer Services Limited, FREEPOST, London WC2N 2BR.

01-839 3351

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My client is an American-owned multi-national with diverse product interests and highly skilled management. Throughout the world sales are made through a tightly controlled distributor network, and consequently the Headquarters operation is a highly efficient, low overhead function, comprising a small and highly proficient team.

The operation is truly international, having responsibility for all markets, apart from the U.S.A. As a result, candidates for all jobs

## SYSTEMS ENGINEER - SOFTWARE

From £8,000 + Car

**THE TASK:**

To support the distributors in their selling and installation work, with particular emphasis on early implementations of new products, and to generally provide a project management capability with reference to software products.

**YOUR BACKGROUND:**

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Ref: RW29/1

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To provide product support to the distributor network. For hardware, to organise training down to chip level. For software, to provide operational feedback. General pre- and post-sales activity, and support of early installations.

**YOUR BACKGROUND:**

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Ref: RW29/3

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**THE TASK:**

To successfully introduce selected new products to the distributor network, including product familiarisation, distributor training and machine performance evaluation.

**YOUR BACKGROUND:**

Educated to degree or H.N.D. Level, and practical experience in design or a senior Field Service role or Product Support.

Ref: RW29/2

## PRODUCT SPECIALIST - PORTABLE DATA ENTRY TERMINALS

C.£7,500 + Car

**THE TASK:**

To provide pre-sales and post-sales support to the distributors with particular reference to the overall systems approach. To assist in new product specifications.

**YOUR BACKGROUND:**

Knowledge of — and preferably practical experience in — Data Communications and Mini-Computers. An interest in Micro-processor technology and a broadly based systems background.

Ref: RW29/4

**hutchinson-scoggins recruitment**  
47/48 New Bond Street (entrance in Maddox Street)  
London W1Y OHE Telephone 01-499 4501

Systems Designers Limited is a British Computer Systems Consultancy which, during the 10 years it has provided the industry with professional support, has established the highest expertise and credibility in the field of mini and micro based systems.

During the 10-year period, the company has grown to 200 professional staff in strength and retained its independence and its informal, though efficient, way of working. The company is still growing, enjoying expansion through a wide variety of work carried out in the U.K., Europe and the USA.

Currently we require Consultants, Engineers and Programmers with software and systems knowledge to help us solve the theoretical and practical problems of this high technology industry, mainly in the areas of:

**COMMUNICATIONS** Military communications procedures; voice, data and message network design, network management systems; message switching, telex and packet switching systems; computer communications protocols.

**INDUSTRIAL** Process control and monitoring, plant control simulation, high speed data analysis and distributed microprocessor system.

**MILITARY** Modelling, avionics and radar systems, complex rigs, simulators, microprocessor missile systems and signal processing.

**SOFTWARE PRODUCTS** CONTEXT software development systems, Ada Compiler design, MASCOT implementation, Information retrieval systems.

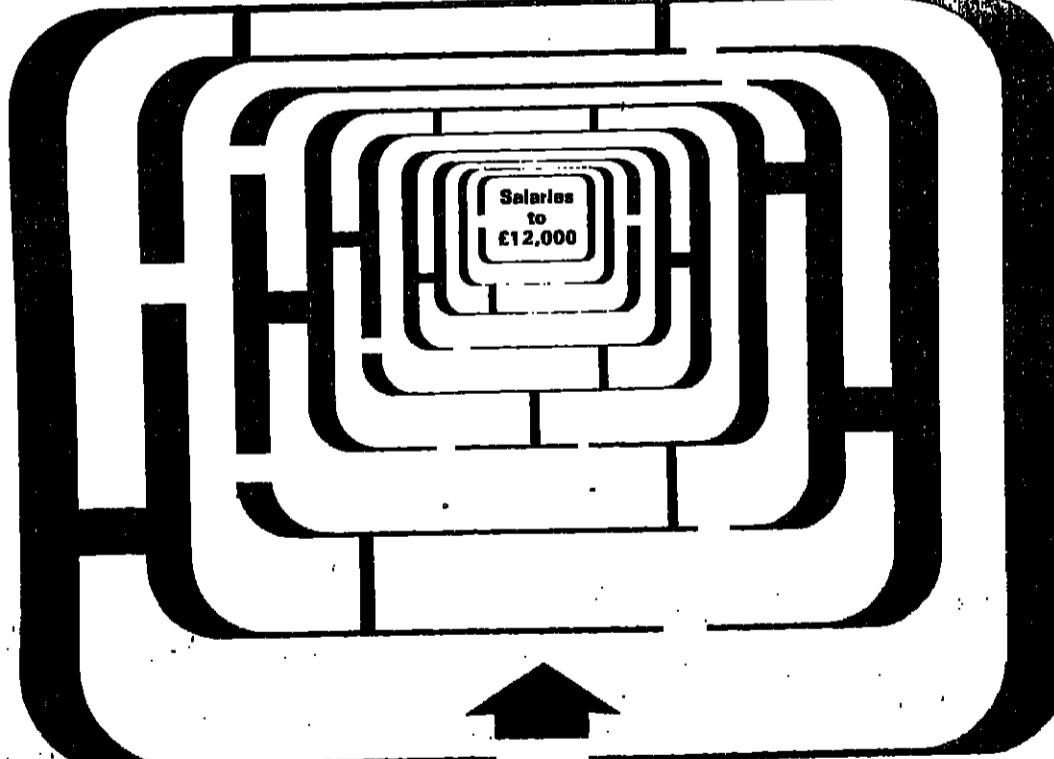
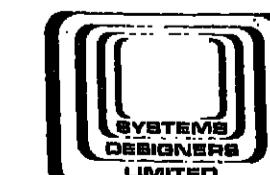
**VIEWDATA** International Viewdata Centre, X25 packet switch links to external databases. New Viewdata products for USA and Europe.

**CONSULTANCY** Project Management, software and systems development technology, complex military systems and theoretical studies.

So, if you have a good academic background, at least one year software experience and are equal to the challenge, we will be very pleased to hear from you.

The company runs productivity bonus, insurance and pension schemes and also offers relocation assistance.

Telephone Ann Gregory for an application form and further information about the company or write to:  
Bill Hockey, Operations Director  
Systems Designers Limited  
1 Pembroke Broadway, Camberley, Surrey GU16 3XH.  
Telephone Camberley (0276) 62244.



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**£10K+Appointments £10K+Appointments £10K+Appointments**

## Oil industry consulting

Logica's Middle East Operation is seeking people to work on the planning and development of advanced data acquisition and control systems for Middle Eastern oil companies.

■ You should have a relevant degree and 8 years experience, of which half should be in industrial systems

■ You should have experience of system design using mini and micro computers and a knowledge of telemetry techniques

■ You should be familiar with aspects of oil or gas production and distribution

■ These posts involve travel to the Middle East on a variety of short and long term assignments assisting clients with various aspects of system design and implementation

# Logica

■ The projects are challenging in terms of scale and exciting in their use of advanced technology

■ Your career record will be expected to justify a basic salary of at least £10,000 p.a., plus an attractive remuneration package for overseas assignments.

These are career positions with excellent prospects for advancement within Logica, the pre-eminent professional services company specialising in the fields of computing, communications and management science.

For further information please call Julia Roth on 01-637 9111 or write for an application form, Ref MEO/9 to:

**Logica Limited,**  
FREEPOST 21,  
London W1A 4JZ.

# MYRIAD

## SYSTEMS MANAGER

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TO £11000

Our client is a large independent public company and market leader in their field. Major investment in D.P. has recently been made to cope with ambitious growth plans for the future. A stimulating and challenging opportunity now exists for a Systems Manager who will play a major role in the expansion of computing facilities offered to associate companies within the group.

The Systems Manager will manage a competent team of Analysts and Programmers involved in the development of a variety of interesting applications. Implementing systems on a project oriented basis the position will entail a high degree of user contact and could involve a limited amount of travelling throughout Europe. In addition to current development activities the person appointed will join the departmental management team and be required to keep abreast of the latest hardware and software innovations in order to effectively contribute with long term strategic plans to ensure the groups market lead is secured well into the late 1980's.

Located at their computer centre in South-West London from which operations throughout the UK are controlled, the company offers a challenging and progressive future with potential expansion to subsidiary companies throughout Europe. In addition to first-class conditions of employment a salary in the region of £11,000 p.a. will be offered. Generous re-location expenses are available where appropriate.

**MYRIAD APPOINTMENTS LIMITED**  
30 Fleet Street London EC4Y 1AA  
01-353 0981 24 HRS.

Ref. E1/1907

Applicants should be able to demonstrate a progressive and successful record of systems implementation and be familiar with sophisticated project estimating and control techniques. Ideally offering experience of on-line systems development, candidates should have the ability to manage an energetic and dynamic team in a highly user oriented organisation. Preferably aged 30 to 35 with a degree or professional qualification applications from candidates with experience of financial systems or distributed processing would be particularly relevant.

**£10K+Appointments £10K+Appointments £10K+Appointments**

**Jacquard Systems**

## Mini-Computer Marketing in Europe

c. £12,000 + Car + Bonus

An unusual opportunity has arisen for a professional computer person to join a fast growing mini-computer company in a senior marketing position based west of London. The company manufactures advanced micro-processor based automated office systems which operate data processing, word processing and communications simultaneously with equal facility. An extensive network of distributors has been set up throughout the world and the prime responsibility of this new appointment is to assist in appointing and supporting additional distributors in the U.K. and Continental Europe.

Extensive travel throughout Europe will be involved. The position will appeal to a technically competent energetic computer marketing person already employed in a computer or consultancy organisation elsewhere.

Experience in all aspects of marketing and installing mini-computers is required and it is likely that the

successful candidate will have worked in the computer industry for at least 5 years.

Knowledge of another European language, preferably French, would be an advantage, likely age range is 28-35 and education to degree level is required.

Salary is negotiable c. £12,000. The total remuneration package includes a motor car, generous pension scheme, free health insurance and other usual benefits. A bonus scheme is also operated.

In the first instance, please send your c.v. to, or request an application form from, Ron Burgess quoting reference RB/CW/2361.

**Jean Dennington Limited**

Personnel Consultants,  
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London W1X 1FF.  
Tel: 01-734 6134.

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### Overseas Computer Assignments

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Our client, one of the world's leading computer companies, have a number of opportunities abroad for qualified Engineers who wish to broaden their knowledge.

2-3 years experience of Unisys 1100 or Unisys 90 series equipment is an essential requirement.

The assignments, offering a variety of locations, are for 1 or 2 year periods.

Generous benefits include:-  
\* cost of living allowance  
\* accommodation allowance  
\* educational allowance for children of school age  
\* regular home leave for entire family

Applicants must be sufficiently mature, confident and flexible to enable them to function in a variety of working environments, and also to be willing to readily adapt to different life styles.

These posts are now available and initial applications should be made immediately. Please write with full details (with career personal) to H. S. Crofts at the address below or telephone 01-379 7383 for an application form.

Please inform us of any companies to whom you do not wish to have your application forwarded.

**Gordon Procter & Partners**  
RECRUITMENT ADVICE AND PLACEMENT  
126 LICHFIELD COVENT GARDEN LONDON WC2E

German Software Company in DUSSELDORF is looking for several experienced

## APPLICATION PROGRAMMERS

to be responsible for developing online standard software packages in the field of Manufacturing Control. We are operating on Texas Instruments Systems.

The successful applicants should have the following qualifications:

- education to degree standards either in commercial or technical subjects
- at least three years' experience in COBOL
- practical experience of realtime and/or online mini computers
- basic knowledge of German is essential

The positions will be rewarded with:

- salaries up to £12,000 p.a.
- life assurance scheme
- 5 weeks' annual paid holidays
- help will also be provided in finding suitable accommodation

Applicants should please send a detailed career history to:  
S. Cavlek, Gerhart-Hauptmann Str. 34, 4006 Erkrath 1, Germany

**So you know all about Systems Software**

**How about Computer Systems to Design Systems Software?**

The brief for this job is to assist in the design and implementation of a methodology for the controlled evolution and maintenance of systems software.

The hardware centres on a major family of mainframe computers together with new systems currently under development.

The location—Southern Germany.

We are looking for:-

### Systems Designers

With at least three years relevant experience to work on the development of technical procedures for a system of computer aided design to be used on operating systems software.

### Senior Programmers

With several years' experience of programming as part of a major project team. The job will be of particular interest to programmers with an interest in the development of systems software.

The main qualifications we require are experience and innovative ability.

The company—an international organisation based in Germany with a first class record in the business world and a reputation for using the skills and talents of their people with imagination and with commonsense.

Background—the people we require will have extensive experience of at least two of these languages—PL/I, Cobol, Assembler, SPL.

To make a contribution to this project you will need a clear understanding of how it should be developed in the future.

In return we can give you the satisfaction of working on the project which will produce the industry standard for systems software development in the '80s.

Extremely attractive salaries are being offered for these positions together with the usual benefits associated with a large international organisation.

The Country—Living in southern Germany can be a reward in itself. The cities offer an enjoyable way of life and the countryside is beautiful and unspoilt.

If you are interested in applying for a position working on this project please write in the first instance giving details of career to date and qualifications to:-

**Altmann & Partner GmbH**

at either:-  
21 Mount Ephraim Rd., or Weissenportz,  
Tunbridge Wells, Kent 5203 Much, West Germany

0892-25702 010-49-2245-2824

Interviews will be arranged in London

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(TRAIN TO ANALYST/PROGRAMMER)

**VICTORIA SW1** to £6,500

A minimum of ONE YEAR'S RPG II experience could be your passport to SYSTEMS ANALYSIS training on this IBM System 34, which has Real-Time architecture and currently supports eight local terminals with a Remote terminal coming on-stream next month.

Our clients are internationally known and market leaders in their field. Current and future work includes both On-Line and Batch systems.

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TELEPHONE: 01-899 6087  
PETER BARSON, Ref: 111

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**Middlesex**

AGB is already Europe's largest Market Research organisation. With the launching of INDEX in 1978, monitoring personal discretionary expenditure and financial holdings, and our expanding range of research into consumer packaged goods, consumer durables and television audience measurement, we are set to substantially increase our £20m turnover.

A strong talented team of computer personnel are essential for the effective running of the computer department, which houses IBM, Honeywell and PDP computers.

Due to this growth, we need to increase the size of our professional programming team. Candidates should have at least 3 years' on-line programming experience plus a basic knowledge of systems design.

We offer a basic salary of c £500 p.a. and an attractive benefits package that includes relocation expenses, where appropriate. To find out more please contact:

**AGB** Chris Toone, Director of Computing,  
Audit of Great Britain Ltd, Audit House,  
Field End Road, Eastcote, Ruislip, Middx. Tel: 01-429 1333.

**SCIENCE RESEARCH COUNCIL**  
**COMPUTER PROGRAMMERS FOR SPACE RESEARCH**

The APPLETON LABORATORY has vacancies for COMPUTER PROGRAMMERS to support several major Space Science projects one of which is the Infra Red Astronomy Satellite (IRAS), due to be launched in August, 1981. The Science Research Council has the responsibility for providing the satellite control centre and a data analysis centre for this project, which is a collaborative venture with the United States and the Netherlands and staff are required to join a team of programmers who are currently preparing the software to be used for processing data from the satellite. The main computers will be PDP 11s, a GEC 4070 and an ICL 2980 and the Programmers will work in the following areas:

- Large-scale data base handling;
- Orbit and attitude analysis;
- Real-time systems software;
- Image processing.

Posts will be available at both Scientific Officer and Higher Scientific Officer levels. Applicants should have a degree, HND, HNC or equivalent qualification in Science, Mathematics or Computer Science, with at least two years' programming experience for the higher posts.

The posts will initially be located at Dilton Park, Slough, but will be transferred later to Chilton, Oxfordshire.

Salary will be on the following scale, the exact step depending on qualifications and experience: £5,002-£6,488 for an HSO or £3,564-£5,369 for an SO. Outer London Weighting Allowance included.

Non-contributory pension scheme.

Please request an application form from:

Miss J. T. Varlet  
Science Research Council  
Appleton Laboratory, Dilton Park  
Slough SL3 8JX  
Telephone: Slough 44234, Ext. 153

Closing date: 9th August, 1979.

**SRCC**

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Birmingham B20 2RL  
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To control and schedule programming section

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To write new, and enhancements to existing, Cobol programs

**★ SYSTEMS ANALYST ★  
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To develop and specify a range of new systems.

Our Client, part of a major manufacturing group, requires applications from candidates who believe they have the necessary ability and determination to succeed in this new and challenging environment. A new ICL 2956/10 has recently been installed for which considerable development work is planned and a range of on-line systems is to be implemented to meet company requirements.

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## NORTH WEST VACANCIES

<b>PRESTON</b>	c £6400 + Bonus + Benefits	<b>NORTH MANCHESTER</b> £6000 <b>SENIOR PROGRAMMER</b>
Major UK organisation requires professional Senior Analysts with over 3 years commercial/manufacturing experience. Excellent prospects and benefits.		Our client is seeking a Senior Programmer with solid COBOL and supervisory experience on ICL 1900/2900 hardware to become Programming Team Leader.
<b>NORTH MANCHESTER</b>	to £5300	<b>MERSEYSIDE</b> £5200 + Benefits <b>RPG II ANALYST/PROGRAMMER</b>
COBOL PROGRAMMERS		IBM System 3 user requires an Analyst/Programmer able to work on own initiative and see systems through to completion. Benefits and prospects excellent.
<b>LIVERPOOL</b>	c £8000 + Benefits	<b>MANCHESTER</b> £6500 <b>CORAL/RTL II</b>
COBOL Programmer with 3 to 4 years commercial experience and some knowledge of either NCR 8000 or TI 9090 Hardware can enjoy an outstanding working environment with a major DP organisation.		To cover business expansion our client is seeking Analysts and Programmers with CORAL 68 or RTL II experience. Knowledge of mini assembler in a process control environment is desirable. 2 years + experience required.
<b>MERSEYSIDE</b>	to £6400 + Benefits	<b>PRESTON</b> £7000 <b>PROJECT LEADER</b>
SYSTEMS ANALYSTS		Large DP user is seeking a Project Leader or Senior Analyst with in-depth systems experience, together with a background in programming. Development work is highly sophisticated.
<b>NORTH CHESHIRE</b>	to £5700	<b>PRESTON</b> to £4900 + Bonus <b>COBOL PROGRAMMERS</b>
COBOL PROGRAMMER		Our client is seeking young IBM COBOL Programmers to supplement development teams. Excellent prospects and Bonus scheme.
<b>LIVERPOOL</b>	to £6250	<b>BIRMINGHAM</b> £7500 <b>SYSTEMS &amp; PROGRAMMING MANAGER</b>
SYSTEMS ANALYST		Senior computer professional needed to head up a systems and programming department. Must have experience in COBOL, ICL 29034 using JCL, and commercial applications. Retell knowledge an advantage.
<b>BURY</b>	c £5000	<b>BIRMINGHAM</b> £10000 + Car <b>BUREAU SALES</b>
COBOL PROGRAMMERS		Computer manufacturer requires a sales person to sell services and hardware. You will have a sound knowledge of mini and/or accounting machine hardware and a good sales record. An excellent opportunity for a dynamic person to work in an existing territory.
<b>BIRMINGHAM</b>	to £6300 <b>SYSTEMS DESIGNERS</b>	The above vacancies are just a few of those available now. If you are looking for a new position then contact us when we can discuss your requirements and find an appropriate job for you quickly.
		Phone STEVE SYKES on LEEDS (0532) 444185 (day) reverse charges if necessary or on LEEDS 662417 (evenings and weekends) for more details on these, or any other positions in the North West. Or write with brief details (no stamp required) to Lorian Computer Services, Ltd., FREEPOST, Leeds LS7 3YY.
<b>BIRMINGHAM</b>	to £6300 <b>FORTAN PROGRAMMERS</b>	Phone PETER GILBERT on LEEDS (0532) 444185 (daytime) or on (0274) 834074 evenings and weekends) for these or any other MIDLANDS vacancy you may require. Alternatively write with brief details (no stamp required) to Lorian Computer Services, FREEPOST, Leeds LS7 3YY.

## LORIEN COMPUTER SERVICES

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Telephone 0532 444185

\* 24 hour Ansaphone service



**JBA** Systems Consultants neg. to £10,000

London Computer Sciences Company is part of the world's largest independent software and systems house. The organisation is planning to greatly increase its activities in the UK business and commercial systems market. As a result several opportunities for experienced senior analysts and designers have been created, with a special emphasis on knowledge of T.P., database, network planning and communications.

A wide range of projects is to be undertaken, so the opportunity for varied and interesting development at the forefront of technology is assured. We are interested in talking to any senior applicants who want to know more.

Contact: Andy Wright

**HOLLAND** Consultants Approx. £20,000

A leading UK systems software house wishes to strengthen its highly successful operation in The Netherlands by the appointment of five senior consultants.

The requirement is for people of consultant calibre, capable of leading large projects and/or designing complex real-time systems. Substantial user contact is necessary and experience of the process industries will be an advantage.

*Those appointed will be expected to become resident in Holland for a period of at least one year, but will be employed by the U.K. parent company. The total salary package whilst abroad will be accompanied by large company benefits.*

Contact: Mike Creamer

**Lecturers** South Coast £8,500 + benefits

A number of vacancies have been created within the Education Division of one of the UK's major computer systems and services companies, due to expansion and growth of this side of their business.

Courses given cover an extremely wide range of technical and other skills for operations, programming, systems and managerial staff. Applicants must therefore possess sound all-round d.p. experience which must include project management presentations and user training.

*An outstanding package includes BUPA, relocation, if appropriate, and occasional overseas travel.*

Contact: Margaret Stevens

**Programmers — Industrial Systems** Berkshire up to £8,500

A well established and highly successful group: part of a large British organisation, are expanding to cope with the increase in the business of specialised real-time systems, including the development of a sophisticated distributed mini/micro system.

Candidates should have at least one year's programming experience using CORAL, RTL, Assembly or other similar languages in a real-time environment. A knowledge of PDP11s, HP or micros would be an asset.

*Excellent salaries, large company benefits and the opportunity to work with professionals on new technology applications.*

Contact: Jim Baker

**Design Engineers** City Based £7,000

Opportunities exist for graduate design engineers to join a small team of specialists, working on the development of Telex message switching systems, using both micro and mini computers. Candidates should be familiar with TTL logic design related to computers, and ideally have had some exposure to ASSEMBLER, data communication techniques and microprocessors.

*This is an excellent opportunity to work on new technology projects.*

Contact: Margaret Stevens

**James Baker Associates, International Personnel Consultants** 16 Maddox Street, London W1. Tel: 01-491 4478

For further information on any of the above vacancies, please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

**MYRIAD****ANALYST/PROGRAMMER → SYSTEMS MANAGER  
IBM SYSTEM 3 → IBM SYSTEM 38****NEAR HIGH WYCOMBE**

Our client, the UK-based member of a large international group, is about to embark upon a new era of computer systems development involving the installation of new hardware and supporting on-line systems. A very interesting opportunity has arisen for a forward thinking analyst/programmer to become an integral part of this period of growth and help provide the expertise to sustain this development.

The commencing salary will be negotiable and is dependent upon experience. The company offices are located in a very attractive rural setting and the company will offer favourable relocation assistance for this appointment. Reference NW4/1907

**MYRIAD APPOINTMENTS LIMITED** Computer Personnel Consultants  
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You will fill a key position at one of a variety of levels within a small hand-picked high calibre team. Technical skills developed in systems programming plus good personal qualities are the essential requirements.

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**Interested?**

Why don't we talk today about the next chapter in your career, telephone Bracknell (0344) 24842 and speak to one of our Line Managers - Gail Williamson on ext. 2039 or Andrew Hutt on ext. 2715 or write to them at ICL, Fawcett Road, Bracknell, Berks, RG12 4SN. Please quote reference CW1443.

Outside working hours you can contact Gail on Bracknell (0344) 23114 and Andrew on Wokingham (0344) 784605.

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You will be selling a full range of products to computer users including magnetic media, filing and storage systems.

You will earn a good salary (£7000+ p.a.) and other benefits include a company car and four weeks' holiday.

Write with details of previous experience to: I.A. Gilbert Esq., Willis Computer Supplies Ltd., P.O. Box 10, Southmill Road, Bishops Stortford, Herts, CM23 3DN.

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**Operator and Control Clerk Vacancies at Lola**

LOLA (London On Line Local Authorities) provides computer facilities to a consortium of four large London Boroughs. The computer centre is situated in modern 4-megabyte IBM 370/158 AP. On-line updating facilities are supported on over 130 remote VDUs with MVS and MVS/VS and programs written in PL/I running under IMS/VIS and MVS.

Post 1

**Deputy Shift Leaders (2 posts)**

Inclusive salary range  
£6586-£6971 p.a.\*

People with drive and enthusiasm who can demonstrate that they have the necessary high level of technical and managerial skills required for these senior posts within the Operations Section. Candidates must have had at least 4 years' operating experience on large IBM mainframes using OS/VS1 or MVS with 2 years at Senior Operator level. An in-depth knowledge of JCL and IBM utilities is essential; you should also have experience of controlling an IMS i.p. network and be familiar with master terminal operator routines.

Post 2

**Leading Operators (2 posts)**

Inclusive salary range  
£5220-£6389 p.a.\*

Candidates should be experienced Operators or Senior Operators with at least 3 years' experience on large IBM mainframe equipment using OS/VS1 or MVS. Knowledge of JCL and IBM utilities is essential and some experience of large i.p. environments is essential.

Post 3

**Operators**

Inclusive salary range  
£4625-£5115 p.a.\*

Applicants should have a minimum of 2 years experience of OS/VS1 or MVS.

Post 4

**Shift Control Clerk**

Inclusive salary range  
£5220-£5763 p.a.\* with possible progress after 6 months to salary range  
£5894-£6389 p.a.\*

Candidates must have had at least 1 year's experience in a Control environment PLUS a good working knowledge of OS, JCL and Utilities.

**FOR ALL THESE POSTS 3-SHIFT WORKING IS IN OPERATION**

\* All salaries quoted are subject to Union acceptance of salary award.

For further information on Posts 1, 2 and 3 telephone Peter Anthony on 01-368 6811, Ext. 268 — for Post 4 ring Norman Bennett on Ext. 230.

Application forms from Mrs. B. Dorrington, LOLA, Tower Point North, Sydney Road, Enfield, Middx, EN2 8UE (Tel: 01-368 6811, Ext. 276).

**LOLA**

**COMPUTER PERSONNEL APPOINTMENTS LTD.**  
Career Specialists and Consultants for:  
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RECRUITMENT MANAGER  
REUTERS  
89 Fleet Street, London EC4P 4AJ

**Systems Analysts**

Candidates for these positions should have had from one to three years' systems analysis, design and implementation experience for the more junior vacancies, to at least three years for senior analysts. A programming background whilst not essential for all positions would be advantageous in some instances.  
(Ref CW/79038)

**Analyst/Programmers**

For consideration for these positions applicants should have three to four years in data processing including considerable experience programming in COBOL. Some systems design experience is also essential and the chances for greater involvement in systems analysis are excellent for suitable candidates.  
(Ref CW/79039)

**Programmers**

The minimum requirement for these vacancies is about 12 months COBOL experience, through to 3 or more years for senior positions which would involve some supervisory and team leading responsibilities. For the more senior positions previous IBM experience is required, preferably in a CICS installation.  
(Ref CW/79040)

**Ivor Norton Management Services Ltd****RECRUITMENT CONSULTING DIVISION**

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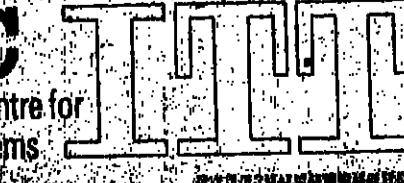
\* developing their technical expertise in highly demanding micro-processing technologies,

\* a salary up to £8,000 plus big company benefits.

Our current projects demand the very best Software Professionals, our projected expansion the very best Software Managers. If you've an eye to the future ring Jack Healey or Chris Turner on Potters Bar (0707)

51199 or write with sufficient details to make an application form unnecessary to the

Administration Centre, ITT, IDECA, Orchard House, Mutton Lane, Potters Bar, Herts EN6 3AR.

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This post reports directly to the Controller, and will suit someone with 3-5 years experience in systems analysis. Good business background and a strong personality are other requirements.

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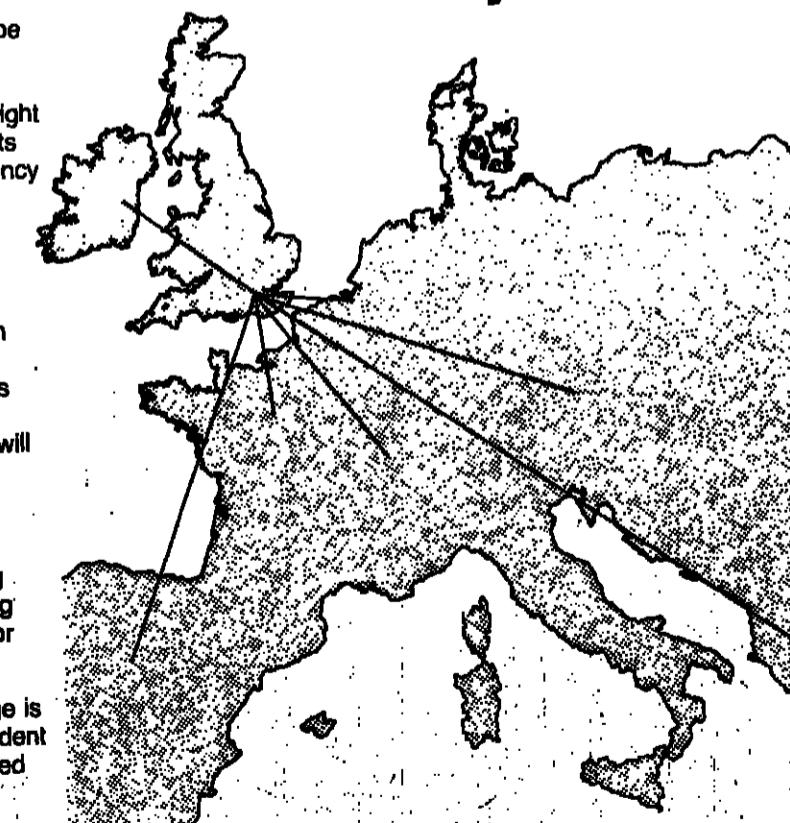
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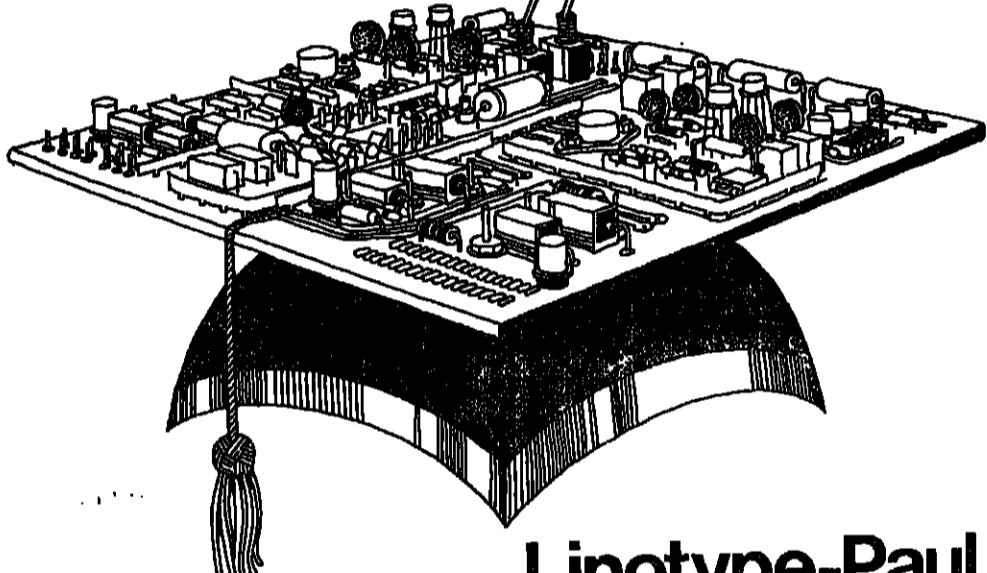
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Staff will be expected to undertake activities, including research, in addition to teaching duties.

**Salary:** £6051-£7065 (Bar) -£7572 per annum  
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Further details and application forms, which should be returned by 17 August, 1979, from: The Personnel Office, The Polytechnic, Queengate, Huddersfield HD1 3DH (Tel: 0484 22288, Ext. 2223). Please quote the relevant reference number.

**RESEARCH FELLOW**  
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(Fixed term two year contract) Ref: ACA/279B/CW

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